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# 1980 BUDGET

## EXPLANATORY NOTES

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SCIENCE AND EDUCATION ADMINISTRATION

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## SCIENCE AND EDUCATION ADMINISTRATION

### Purpose Statement

The Science and Education Administration (SEA) was created to provide overall coordination, planning and support for food and agricultural science and education programs. It conducts and supports research across the broad range of food and agricultural sciences, including human nutrition. It communicates and demonstrates the results of this research to farmers, processors, consumers, and other groups. It provides facts and expertise in support of the policy and regulatory functions and of "action" programs of the Department of Agriculture and other government agencies. It develops and maintains library and computer information systems to assist the public, researchers, and educators. It responds to International food and agriculture needs through research and education.

SEA enables the USDA to carry out more effectively the "lead agency" role assigned to it by the Food and Agriculture Act of 1977. SEA units also include Agricultural Research, which conducts basic and applied research at more than 150 locations in the U.S. and overseas; Cooperative Research, which makes funds available to state agricultural experiment stations and coordinates State-Federal research involving more than 100 institutions and agencies; Extension, which works in partnership with the Cooperative State Extension Services and their county agents in 3,150 offices across the country; Technical Information Systems, which maintains a permanent collection of materials on food and agriculture and helps the public use a vast library and computerized information retrieval system; the Human Nutrition Center, which directs and coordinates Federally funded research in human nutrition; and Competitive Research Grants, a new office awarding grants for priority research based on competition among all scientists and among all universities, organizations, and institutions, whether public or private. SEA's Joint Program Planning and Evaluation Staff coordinates priority programs like energy, human nutrition, and natural resources through special project leaders working with regular program managers. It also provides support to two top advisory bodies created by the Food and Agriculture Act: The Joint Council on Food and Agricultural Sciences and the National Agricultural Research and Extension Users Advisory Board.



Available Funds and Man-Years

1978 and Estimated, 1979 and 1980

Item	Actual		Estimated		Budget Estimate	
	1978		Available, 1979		1980	
	Amount	Work-Years	Amount	Work-Years	Amount	Work-Years
Direct Appropriation:						
Agricultural Research	\$325,131,573	9,439	\$382,012,000	9,399	\$344,872,000	9,024
Cooperative Research..	143,147,836	98	159,395,000	90	148,317,000	90
Extension .....	257,557,672	203	263,899,000	202	259,227,000	203
Technical Info.						
Systems .....	7,108,889	210	7,727,000	222	7,835,000	222
Competitive Grants ...	15,000,000	9	15,000,000	18	30,000,000	18
Higher Education .....	11,500,000	-	11,500,000	-	- - -	- -
Scientific activities :						
overseas (Special :						
Foreign Currency) ..	5,750,000	9	5,750,000	10	7,500,000	10
Total, Direct						
Appropriation .....	765,195,970	9,968	847,283,000	9,941	797,751,000	9,567
Deduct Allotments to						
other Agencies .....	-2,509,084	-19	-1,486,427	-4	-1,486,427	-4
Net .....	762,686,886	9,949	845,796,573	9,937	796,264,573	9,563
Obligations from other						
USDA Appropriations						
available to:						
Agricultural						
Research .....	8,354,112	185	11,064,170	202	10,545,170	210
Cooperative Research:	292,701	8	- - -	- -	- - -	- -
Extension .....	839,700	-	747,602	-	2,450,000	-
Technical Info.						
Systems .....	385,675	7	279,000	8	279,000	8
Competitive Grants ..	- - -	-	- - -	-	- - -	-
Higher Education ...	- - -	-	- - -	-	- - -	-
Scientific						
activities overseas :						
(Special Foreign						
Currency) .....	- - -	-	- - -	-	- - -	-
Total, Other USDA :						
Appropriations ...	9,872,188	200	12,090,772	210	13,274,170	218
Total, Agriculture:						
Appropriations ...	772,558,974	10,149	857,687,345	10,147	809,538,743	9,781
Other Federal Funds						
Available to:						
Agricultural						
Research .....	9,118,496	107	10,590,077	90	11,109,077	82
Cooperative Research:	1,865,364	-	1,397,000	-	1,397,000	-
Extension .....	1,218,464	1	1,230,000	1	880,000	1
Technical Info.						
Systems .....	36,898	-	18,000	-	- - -	-
Competitive Grants ..	- - -	-	- - -	-	- - -	-
Higher Education ...	- - -	-	- - -	-	- - -	-
Scientific						
activities overseas :						
(Special Foreign						
Currency) .....	- - -	-	- - -	-	- - -	-

Total, other	:									
Federal Funds	:	12,239,222	:	108:	13,235,077	:	91:	13,386,077	:	83
	:		:			:			:	
Non-Federal Funds	:		:			:			:	
available to:	:		:			:			:	
Agricultural	:		:			:			:	
Research .....	:	2,769,392	:	31:	2,845,753	:	31:	2,845,753	:	31
Cooperative Research:	:	2,958	:	- -:	- - -	:	- -:	- - -	:	- -
Extension .....	:	773,626	:	- -:	900,000	:	- -:	900,000	:	- -
Technical Info.	:		:			:			:	
Systems .....	:	- - -	:	- -:	113,000	:	- -:	113,000	:	- -
Competitive Grants ..	:	- - -	:	- -:	- - -	:	- -:	- - -	:	- -
Higher Education ...:	:	- - -	:	- -:	- - -	:	- -:	- - -	:	- -
Scientific	:		:			:			:	
activities overseas	:		:			:			:	
(Special Foreign	:		:			:			:	
Currency) .....	:	- - -	:	- -:	- - -	:	- -:	- - -	:	- -
Total, Non-Federal:	:		:			:			:	
Funds .....	:	3,545,976	:	31:	3,858,753	:	31:	3,858,753	:	31
TOTAL, Science and	:		:			:			:	
Education Administration:	:	788,344,272	:	10,288:	874,981,175	:	10,269:	826,783,573	:	9,895

	1978 <u>Actual</u>	1979 <u>Estimated</u>	1980 <u>Estimate</u>
End-of-Year Employment:			
Permanent Full-time:			
Agricultural Research..	8,293	8,072	7,577
Cooperative Research ..	92	78	78
Extension .....	164	180	180
Technical Info. Systems	163	202	202
Competitive Grants ....	15	23	23
Higher Education .....	- -	- -	- -
Total, Permanent Full-time .....	8,727	8,555	8,060
Other:			
Agricultural Research..	1,404	1,246	1,304
Cooperative Research ..	14	6	6
Extension .....	13	12	12
Technical Info. Systems	17	26	26
Competitive Grants ....	3	- -	- -
Higher Education .....	- -	- -	- -
Total, Other	1,451	1,290	1,348
Youth Program and develop ment positions under the Worker-Trainee Oppor- tunity Program .....	245	301	301
Total .....	10,423	10,146	9,709



SCIENCE AND EDUCATION ADMINISTRATION

Appropriation Act, 1979 .....	\$ 837,207,000
Budget Estimate, 1980 .....	797,751,000
Decrease in Appropriation.....	<u>-39,456,000</u>

Adjustments in 1979:

Appropriation Act, 1979.....	837,207,000
1979 Supplemental Appropriation for pay cost .....	10,250,000
Transfer in Estimate a/.....	<u>-174,000</u>
Adjusted base for 1980.....	847,283,000
Budget Estimate, 1980.....	797,751,000
Decrease over adjusted 1979.....	<u>-49,532,000</u>

a/ The functions for the National Poultry Improvement Plan will be transferred from this account to the Animal and Plant Health Inspection Service.

SUMMARY OF INCREASES AND DECREASES  
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1979</u> <u>Estimated</u>	<u>Program</u> <u>Changes</u>	<u>1980</u> <u>Estimated</u>
SEA unit:			
Agricultural Research .....	\$348,292,000	-\$3,420,000	\$344,872,000
Cooperative Research.....	159,395,000	-11,078,000	148,317,000
Competitive Research Grants.....	15,000,000	+15,000,000	30,000,000
Extension.....	263,899,000	-5,922,000	257,977,000
Technical Information Systems...	7,727,000	+108,000	7,835,000
Higher Education.....	11,500,000	-10,250,000	1,250,000
Scientific Activities Overseas (Special Foreign Currency)....	5,750,000	+1,750,000	7,500,000
Subtotal.....	811,563,000	-13,812,000	797,751,000
Non-recurring Construction.....	35,720,000	-35,720,000	- -
TOTAL AVAILABLE.....	<u>847,283,000</u>	<u>49,532,000</u>	<u>797,751,000</u>

a/ Includes a reduction of \$663,000 in travel costs as a part of the Departmentwide management initiatives to reduce travel costs. Includes a total increase of \$750,000 for the portion of pay increases effective in FY 1979 which are established in FY 1979 but which are needed to carry out the programs proposed for FY 1980.

Science and Education Administration research and extension activities have been reviewed and evaluated on an agency-wide basis in the following program areas to determine their effectiveness in meeting goals and objectives and solving national problems.

	<u>Budget Authority</u>			<u>Change</u>
	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1979 to 1980</u>
Crop production and protection.....	\$222,227	\$242,560	\$249,486	+\$6,926
Animal production and protection.....	113,746	131,890	127,050	-4,840
Processing, storage, distribution and marketing.....	89,134	87,505	75,334	-12,171
Human nutrition.....	76,578	84,792	91,389	+6,597
Food, farm and human safety.....	21,720	25,510	27,655	+2,145
Natural resources and forestry.....	76,980	79,625	82,802	+3,177
Home economics, consumer services and family living.....	30,790	31,642	31,481	-161
Rural and community development.....	29,544	30,311	25,141	-5,170
Youth development (4-H).....	67,440	68,989	68,816	-173
Technical information systems.....	8,997	8,023	8,131	+108
Higher education.....	11,500	11,500	1,250	-10,250
Contingency and repair and maintenance.	15,100	9,216	9,216	- -
Subtotal.....	763,756	811,563	797,751	-13,812
Construction (non-recurring).....	3,091	35,720	- -	-35,720
Total.....	<u>766,847</u>	<u>847,283</u>	<u>797,751</u>	<u>-49,532</u>

New or Expanded Program, FY 1980  
(in thousands of dollars)

<u>Areas of Emphasis</u>	<u>Agricultural Research</u>	<u>Cooperative Research</u>	<u>Extension</u>	<u>Competitive Grant Office</u>	<u>Office of Higher Education</u>	<u>Total</u>
1. Energy ...	\$4,750	\$2,400	\$ 300	- -	- -	\$7,450
2. Basic Animal Research.	5,000	- -	- -	- -	- -	5,000
3. Integrated Pest Man- agement..	2,500	3,000	1,000	- -	- -	6,500
4. Non-Point Source Pollution	2,000	2,800	1,300	- -	- -	6,100
5. Food Safety (Nitrite).	1,000	- -	- -	- -	- -	1,000
6. Human Health & Safety (Basic Research).	2,400	- -	- -	- -	- -	2,400
7. Competi- tive Edu- cation Grants....	- -	- -	- -	- -	1,250	1,250
8. Aerospace Technology	2,200	- -	- -	- -	- -	2,200
9. Human Nu- trition...	1,750	- -	- -	- -	- -	1,750
10. Human Nu- trition Centers...	2,000	- -	- -	- -	- -	2,000
11. Germplasm..	500	- -	- -	- -	- -	500
12. Competi- tive Re- search Grants (Plant Sciences).	- -	- -	- -	11,000	- -	11,000
13. Competitive Research Grants (Human Nu- trition)...	- -	- -	- -	4,000	- -	4,000
Total...	24,100	8,200	2,600	15,000	1,250	51,150
						+1,937 a/
						53,087

a/ Other items include TIS (\$108), Special Foreign Currency (\$1,750) and net of increased pay and travel reductions (\$79).

1. Energy: A new program of research, development and demonstration is proposed through the establishment and operation of two Federal Energy Research Centers and other satellite locations. Contracts and grants will be made to the State Experiment Stations and the State Extension Services to augment the work in these centers with research, development, and demonstration. This proposal will enable SEA-USDA to implement a primary energy program designed to:
  - screen, evaluate, and develop production practices for crop species which may be substituted for energy with emphasis on the use of set-aside acreages.
  - reduce agriculture's dependence on fossil fuels through development of applications of biomass energy.
  - increase the energy efficiency of agricultural production systems.
2. Basic Animal Research: This expanded research program will provide new expertise and technique needed in solving fundamental problems involved in the livestock and poultry production. A more complete understanding of the biological

processes that occurs in the production and control of diseases of animals can help reduce the costs of animal products to consumers, improve the quality of food from animals, and reduce the dependency of animal production and disease control on drugs. Specific research objectives will be:

- To understand how animals resist and overcome disease.
  - By genetically modifying micro-organisms, to allow more efficient digestion of feed, utilization of waste, and production of viral antigens which can be used as vaccines against disease.
  - To identify and control physiological mechanisms responsible for estrus, ovulation, broodiness, fertilization, embryo survival, and sex control.
  - To determine how nutrients, hormones, and enzymes affect feed consumption and, at the cellular level, affect milk, egg, and tissue synthesis.
  - To understand the chemical, physical, and microbial intestinal environment needed for optimum digestion and absorption and speed up the rate limiting steps in the growth process.
3. Integrated Pest Management: The objective of this expanded IPM program is to assist a greater number of producers, homeowners and the public in general to reduce losses caused by pests, reduce costs of control, improve environmental quality, and optimize production profits through superior production and pest management systems. Specifically, this program will concentrate on:
- research and development of IPM system and predictive models, and integration of pest control components against selected migrating insects, aquatic and small grain weeds, and plant diseases that are applicable to broad ecological zones; and conduct intensive pilot tests to integrate various control technologies into systems.
  - development of IPM modeling and systems capabilities within States to refine and adapt existing technologies to meet State and local needs on commodities like pome fruits, soybeans, alfalfa, and corn.
  - integration into existing delivery systems those technologies developed by Federal and State scientists.
4. Non-Point Source Pollution: This expanded program is requested to meet research and extension needs for controlling the entry of non-point or diffuse sources of pollutants from croplands, forests and rangelands into the Nation's lakes and ground water supplies, and streams as well as to help farmers, ranchers, producers, processors and others to meet environmental quality standards as directed by section 208 of the Federal Water Pollution Control Act (P.L. 92-500) and the Clean Water Act (P.L. 95-217) and other environmental regulations. Information and techniques for recycling wastes and reducing the potential for pollution of soil, water, and air resources by agricultural and forestry practices as well as by industrial wastes, municipal sludges and effluents, and other sources will be developed. Specific program objectives will be to:
- evaluate the effects of cultural practices, flora and fauna, surface roughness, and water application methods on the hydraulic properties of soils
  - develop a hydrologic classification of soils based on soil morphology and taxonomy
  - evaluate the effect of the point to point variability in soil properties on the movement of water sediment, and pollutants.
5. Food Safety (Nitrites): This program is requested to intensify current research efforts in developing alternatives to nitrites in cured meat and meat products. Suitable substitutes must be developed as a preparation to the possible elimination on the use of nitrites, judged to be a possible cancer causing agent when combined with other chemicals in laboratory tests of animals. This ban could become effective within 12 to 15 months. The research strategy is to:
- continue high priority research effort to develop procedures that will reduce or eliminate nitrosamines formed in cured meat, particularly bacon
  - increase research emphasis in developing alternatives to nitrites in meat processing, and an anti-botulism factor other than nitrite in meat curing.
6. Human Health and Safety: This program would expand basic research in the following areas:
- on unique bonding (metal-ligand complexes) that occur between metal ions and large molecules during the collection and handling of materials to develop



- safer methods of recycling these residues into the soil. These include manures, sludges and other municipal wastes and crop residues which contain valuable plant nutrients and organic materials essential for maintaining soil fertility.
- isolate, identify, and control natural toxicants in vegetables and fruits such as potatoes, cabbages, carrots, tomatoes, and their having adverse biological effects on humans to guide plant breeders and food producers to develop, grow and handle new varieties of vegetables and fruits for human consumption.
  - reduce grain contaminants caused by poisonous plant materials produced by such weeds as jimson weeds and crotonaria that are grown and harvested with grain.
  - investigate pesticide, hormone, and antibiotic residues and other unsafe materials in food and feed through the use of fast and nondestructive methods to avoid expensive, complex and chemical destruction of specimen. This would involve the use of various energy carrying waves such as X-rays, ultra-violet and visible light, infra-red radiation and micro waves.
  - develop commercially applicable methods to reduce the level of salmonella organisms entering the processing of plants and remaining in animal products after processing.
  - develop methods to identify causative organisms and to distinguish between pathogenic and non-pathogenic related organisms for use in developing better immunologic methods to detect and prevent infections of animals and man.
7. Competitive Education Grants: This program is requested to accelerate the educational development of colleges and universities with predominant minority enrollments such as the 1890 institution, Tuskegee, and others in the food and agriculture sciences. Presently, there exists a shortage of minority professionals in these fields. This program can help in reversing this trend by improving the quality of the academic programs of these institutions in the food and agriculture sciences and provide the impetus for a stronger program of research, extension and demonstration in these institutions. Funds would be used to support cooperative projects to enhance faculty exchange and/or development, student recruitment, student retention, curriculum development, research coordination and public service activities.
8. Aerospace Technology: This program is proposed to expand current research in the application of aerospace technology in such areas as crop yield modeling and prediction, crop stress identification, commodity production estimates, insect and disease infestation, land use, resource and conservation inventory and assessments, pollution assessments, soil moisture determination, solar insolation measurements, identification of crops, crop stages, and crop condition, detection of brush problems on ranges, and evaluation of aerospace technology applications for other agricultural uses. Successful applications of aerospace technology will:
- expedite data collection and handling;
  - help stabilize the production and price of major crops on world market regardless of weather conditions;
  - improve the competitiveness of U.S. farm products in world market;
  - assist action agencies in the implementation and monitoring of their programs.
9. Human Nutrition: This expanded program would provide for the development of new knowledge needed to improve the dietary and nutritional status of the American people with emphasis on food preferences and food habits; nutrient composition of foods; and techniques and equipment to guide consumers in their food selection. Principally, this program is designed to:
- develop and update information and guidance materials for nutrition educators;
  - increase the cost-effectiveness and accelerate achievement targets of the nutrition program through the development of analytical methods and analyses.
  - expand the Nutrient Data Bank with additional data on the nutrient content of meats, fresh fruits and vegetables.
  - identify and appraise the nutritional properties and contributions of foods including the study of fresh and processed foods.



--assess the bioavailability and chemically useful forms of nutrients in foods,  
--determine and evaluate nutritional antagonists in foods.

10. Human Nutrition Center: This request provides staffing for the Human Nutrition Center at Tufts University. The center is not scheduled for completion until sometime in 1981, however, it is essential to set-up the center's staffing and equipment needs beginning in fiscal year 1980 to achieve maximum utility of the center and to avoid operational delays when it opens. A number of important and high priority research on nutritional problems which needs immediate attention can be carried out with interim arrangements until the facility is completed. These include research needs on the characterization and prevention of osteoporosis, anemia, and gastro intestinal problems, and assessment of the nutritional status and food consumption habits of the elderly.

11. Germplasm: The proposed increase would permit the Science and Education Administration to continue its plan of constructing and operating national fruit and nut germplasm repositories in strategic locations.

12. Competitive Research Grants (Crops): The four areas of crop research selected for increased support provide great opportunities to develop fundamental knowledge necessary to increase crop productivity and the dependability of the food supply. These areas are photosynthesis, biological nitrogen fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses. Research areas to be emphasized in each of these areas follows:

--Biological Nitrogen Fixation. Adequate supplies of nitrogen are essential to crop productivity. Because of high energy costs and other factors, existing biologic technologies for providing nitrogen to crops must be improved and new technologies developed.

-- Genetic Mechanisms for Crop Improvement. Conventional plant breeding methods can be used to transfer germplasm only among close relatives in the plant kingdom. Research is needed to determine those plant processes and characteristics which can be used by plant breeders in manipulating plants to increase crop productivity. Biochemists and plant physiologists must be brought into an active team participation with plant breeders and other scientists to identify new ways of transferring desirable genes to plant species used by man. Studies are needed to use pollen cells, tissue culture techniques, and other novel approaches to accelerate genetic improvement of crop plants. Cellular and molecular methods must be developed to permit identification of desirable plant characteristics (or genes) and facilitate their transfer among plants.

-- photosynthesis. ninety-five percent of the dry weight of plants is a result of photosynthesis. Studies are needed to determine the fundamental biology involved in more efficient partitioning of the products of photosynthesis into food products of high nutritional value. Expansion of research to develop new methodology for plant breeders is needed to identify and incorporate improved photosynthetic efficiency into crops. Identification of aspects of photosynthesis which limit the conversion of solar energy into stable chemical products (sugars, starch, etc.) is highly important. Attempts at enhancing photosynthetic efficiency are to be successful.

-- Biological Stresses on Plants. Plant pests are a major limitation to high crop productivity. Progress in reducing pest losses has been impeded by the rapid obsolescence of available technology, various changes in production practices, and by genetic changes in the pest affecting crop productivity. Increased research is needed to identify how plants react to stressful interactions and how damage from such interactions may be reduced or eliminated. Emphasis will be on stresses caused by weeds, nematodes, pest insects, and pathological microorganisms.

13. Competitive Research Grants (Human Nutrition): The base of research knowledge in human nutrition needs to be expanded if we are to make sound recommendations to improve dietary practices for humans. Emphasis will be placed on the biochemical and metabolic relationships of the nutrients consumed by our citizens. For example, knowledge must be expanded above the cellular level to where we can understand what happens nutritionally with the total person. This could bring about the best uses of agricultural resources by planning food production on the basis of nutritional needs for

for people. Food programs could also be designed which would enable humans to maintain longer, more productive, and satisfying lives. This research would move a step closer in meeting the national goal of USDA to provide foods to assure adequate diets to all. Moreover, an expanded nutritional research program can contribute to strengthening the Nation's economy and to the wellbeing of its citizens.

In line with a government-wide effort to reduce federal spending and meet President's Carter's goal of cutting the Federal deficit, the budget proposes the reduction and/or elimination of some programs not now regarded as being of highest importance for support by Federal Funds.

These programs primarily contain projects which: (1) are reaching completion (2) are not expected to achieve additional significant results (3) are limited in scope or relative importance to serve national needs, or (4) for which continuing research on other related projects will be adequate for continued purposes on a given area of research.

Reduced or Terminated Programs, FY 1980

<u>Program Area</u>	<u>Agricultural Research</u>	<u>Cooperative Research</u>	<u>Extension</u>	<u>Office of Higher Education</u>	<u>Total</u>
Crops Prod. & Prot....	-9,956	-4,263	- -	- -	-14,219
Animal Prod. & Prot...	-4,142	-10,000	- -	- -	-14,142
Processing, Storage, Dist., Mkt.....	-11,158	-500	-3,000	- -	-14,268
Natural Resources.....	-1,468	-2,800	- -	- -	-4,268
Human Health & Safety.	-153	- -	-1,020	- -	-1,173
Rural Development.....	-389	-1,800	-3,500	- -	-5,689
Human Nutrition.....	- -	- -	-1,250	- -	-1,250
Education Assistance..	- -	- -	- -	-11,500	-11,500
Total.....	<u>-27,266</u>	<u>-19,363</u>	<u>-8,770</u>	<u>-11,500</u>	<u>-66,899</u>

ADDITIONAL EXPLANATORY INFORMATION ON ALL THE ABOVE PROPOSED CHANGES ARE OUTLINED IN SUCCEEDING PAGES.



SCIENCE AND EDUCATION ADMINISTRATION  
AGRICULTURAL RESEARCH

Purpose Statement

Agricultural Research (formerly Agricultural Research Service) was established on November 2, 1953, pursuant to authority vested in the Secretary of Agriculture by 5 U.S.C. 301 and Reorganization Plan No. 2 of 1953, and other authorities.

The research performed by Agricultural Research (AR) is authorized by the Department of Agriculture Organic Act of 1862 (5 U.S.C. 511), the Research and Marketing Act of 1946, as amended (7 U.S.C. 427, 427i), and the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (P.L. 95-113).

Agricultural Research is responsible for conducting basic, applied, and developmental research of:

- Animal production
- Plant production
- Use and improvement of soil, water, and air
- Processing, storage, distribution, food safety, and consumer services
- Human nutrition research

The research applies to a wide range of goals; commodities; natural resources; fields of science; and geographic, climatic, and environmental conditions. It is categorized into 67 AR National Research Programs and eight Special Research Programs.

The mission of AR research is to develop new knowledge and technology which will insure an abundance of high quality agricultural commodities and products at reasonable prices to meet the increasing needs of an expanding economy and to provide for the continued improvement in the standard of living of all Americans. This mission focuses on the development of technical information and technical products which bear directly on the needs to (1) manage and use the Nation's soil, water, air, and climatic resources, and improve the Nation's environment; (2) provide an adequate supply of agricultural products by practices that will maintain a permanent and effective agriculture; (3) improve the nutrition and well-being of the American people; (4) improve living in rural America; (5) strengthen the Nation's balance of payments; and (6) promote world peace.

Research is conducted at numerous field locations in the States, District of Columbia, Puerto Rico, the Virgin Islands, and in several foreign countries. Much of the work is conducted in direct cooperation with the State agricultural experiment stations, other State and Federal agencies, and private organizations.

Central offices for the Deputy Director of AR and his staff, which are in the Washington, D.C. Metropolitan Area, provide overall leadership and direction to the programs and activities assigned to Agricultural Research. The field activities are managed on a geographical basis through four Regional Offices, 19 Area Offices, and seven major Research Centers. Research activities are carried out at 152 separate field locations. As of September 30, 1978, AR employed 8,293 PFT employees and 1,392 other than permanent employees.

Under the authority of Section 104(b)(1) and (3) of Public Law 480, the Agricultural Trade Development and Assistance Act of 1954, as amended, SEA directs foreign research mutually beneficial to the United States and the host country which can be advantageously conducted in foreign countries.



Agricultural Research

Appropriation Act, 1979.....	\$ 338,416,000 <sup>a/</sup>
Budget Estimates, 1980.....	<u>344,872,000</u>
Increase in appropriation.....	<u>+6,456,000</u>

Adjustment in 1979:

Appropriation Act, 1979.....	\$ 338,416,000	
Transfer in Estimate.....	-174,000 <sup>b/</sup>	
Supplemental Appropriations:		
Pay Costs.....	+10,050,000	
Adjusted base for 1980.....		348,292,000
Budget Estimate, 1980.....		<u>344,872,000</u>
Decrease over adjusted 1979.....		<u>\$ -3,420,000</u>

<sup>a/</sup> Excludes reappropriation of \$2,000,000 of prior year funds for additional labor, subprofessional and junior scientific help in the field.

<sup>b/</sup> Transfer in the Estimates on the National Poultry Improvement Plan to Animal and Plant Health Inspection Service.

SUMMARY OF INCREASES AND DECREASES  
(on basis of adjusted appropriation)

<u>Item of Change</u>	<u>1979 Estimated</u>	<u>Program Changes</u>	<u>1980 Estimated</u>
Basic research in animal production efficiency .....	\$ 20,592,000	\$+5,000,000	\$ 25,592,000
Improved energy efficiency in crop and animal production .....	1,139,000	+4,750,000	5,889,000
Improved integrated pest management systems .....	3,100,000	+2,500,000	5,600,000
Use of aerospace technology in crop forecasting and other areas .....	651,000	+2,200,000	2,851,000
Control of non-point source pollution on agricultural lands ..	6,260,000	+2,000,000	8,260,000
Insuring the safety and health of food supplies .....	15,659,000	+3,400,000	19,059,000
Assessing the nutritional value of food supplies .....	22,008,000	+3,750,000	25,758,000
Germplasm repository .....	500,000	+500,000	1,000,000
Equipping regional Veterinary School at Virginia Polytechnic Institute	1,250,000	-1,250,000	- -
Dairy Forage Clusters .....	900,000	-900,000	- -
Contagious Equine Metritis .....	500,000	-500,000	- -

	<u>1979 Estimated</u>	<u>Program Changes</u>	<u>1980 Estimated</u>
Other animal disease and production research projects .....	42,308,000	-1,890,000	40,418,000
Staffing at Kearneysville, West Virginia .....	1,371,000	-1,100,000	271,000
Tobacco production .....	1,048,000	-1,048,000	- -
Cotton production .....	5,030,000	-869,000	4,161,000
Other plant disease and production research projects being reduced .	120,125,000	-6,545,000	113,580,000
Research on rural housing .....	389,000	-389,000	- -
Conservation research projects being reduced .....	14,643,000	-1,468,000	13,175,000
Wool and mohair research projects being reduced .....	1,748,000	-1,224,000	524,000
Processing alcohol fuels .....	500,000	-500,000	- -
Other post-harvest technology research projects being reduced .	54,330,000	-9,587,000	44,743,000
All Other .....	34,247,000	-250,000	33,997,000
Total Available	<u>\$348,292,000</u>	<u>\$-3,420,000<sup>a/</sup></u>	<u>\$344,872,000</u>

<sup>a/</sup> Includes a total reduction of \$550,000 in travel costs as a part of the Department-wide management initiative to reduce travel costs. Includes a total increase of \$300,000 for the portion of pay increases effective in FY 1979 which were absorbed in FY 1979 but which are needed to carry out the programs proposed in FY 1980.



PROJECT STATEMENT  
(on basis of adjusted appropriation)

	1978 Actual	1979 (Estimated)	Increase or Decrease	1980 (Estimated)
1. <u>Research on animal</u> <u>Production</u>				
(a) Animal production efficiency research	62,156,157	65,604,000	+2,675,000	68,279,000
(b) Research on housing	<u>422,181</u>	<u>389,000</u>	<u>-389,000</u>	<u>- -</u>
Total, Research on animal production.....	62,578,338	65,993,000	+2,286,000(1)	68,279,000
2. <u>Research on plant</u> <u>production:</u>				
(a) Crop production efficiency research.....	121,310,525	131,865,000	-4,282,000	127,583,000
(b) Tropical and sub- tropical agricul- tural Research....	<u>713,726</u>	<u>2,263,000</u>	<u>- -</u>	<u>2,263,000</u>
Total, Research on plant production.....	122,024,251	134,128,000	-4,282,000(2)	129,846,000
3. <u>Research on the Use</u> <u>and improvement of</u> <u>soil, water, and</u> <u>air:</u>				
(a) Research on conservation and use of land and water resources and maintain- ing environ- mental quality..	28,748,852	32,673,000	+1,680,000	34,353,000
(b) Research on water- shed development.	<u>10,519,722</u>	<u>10,578,000</u>	<u>+971,000</u>	<u>11,549,000</u>
Total, Research on the use and improvement of soil, water, and air...	39,268,574	43,251,000	+2,651,000(3)	45,902,000
4. <u>Processing, storage,</u> <u>distribution, food</u> <u>safety, and consu-</u> <u>mer services re-</u> <u>search:</u>				
(a) Processing, stor- age and distribu- tion efficiency research.....	57,520,323	56,578,000	-11,101,000	45,477,000
(b) Research to expand agricultural exports .....	2,532,708	2,840,000	+4,000	2,844,000
(c) Research to improve human health and safety .....	12,628,804	15,653,000	+3,260,000	18,913,000
(d) Research on con- sumer services..	<u>594,867</u>	<u>625,000</u>	<u>- -</u>	<u>625,000</u>
Total, Processing, stor- age and distribution, food safety, and con- sumer services research..	73,276,702	75,696,000	-7,837,000(4)	67,859,000

	1978 Actual	1979 (Estimated)	Increase or Decrease	1980 (Estimated)
5. <u>Research on human nutrition.....</u>	15,419,691	22,008,000	+3,762,000(5)	25,770,000
6. <u>Construction of facilities.....</u>	3,091,000	- -	- -	- -
7. <u>Repair and main- tenance of facil- ities and equip- ment.....</u>	<u>a/ - -</u>	8,216,000	- -	8,216,000
8. <u>Contingency Research Fund.....</u>	<u>b/ - -</u>	1,000,000	- -	1,000,000
Unobligated balance.....	9,473,017	- -	- -	- -
Subtotal.....	325,131,573	350,292,000	-3,420,000	346,872,000
Deduct reappro- priation for Special fund....	<u>-2,000,000</u>	<u>-2,000,000</u>	<u>- -</u>	<u>-2,000,000</u>
Total available or Estimate	323,131,573	348,292,000	<u>-3,420,000</u>	<u>344,872,000</u>
Transfer in Estimate:				
To CSRS.....	+15,000,000	- -		
To APHIS.....	- -	+174,000		
Supplemental for pay costs.....	<u>- -</u>	<u>-10,050,000</u>		
Total, Appropriation	<u>338,131,573</u>	<u>338,416,000</u>		

a/ Obligations for the \$8,216,000 appropriated in 1978 are included in the projects above.

b/ Obligations for the \$1,000,000 appropriated in 1978 are included in the projects above.



JUSTIFICATION OF INCREASES AND DECREASES

1. A net increase of \$2,286,000 for research on animal production consisting of:
  - (a) A decrease of \$176,000 for reduced travel.  
An increase of \$47,000 for FY 1979 increases.
  - (b) An increase of \$5,000,000 in basic animal research \$20,592,000 available in FY 1979).

Need for Change: Advances in food and agricultural sciences and technology have become increasingly limited by the concentration upon the thorough development and exploitation of currently known scientific principles and technological approaches at the expense of fundamental or basic research.

It is the general consensus of the scientific community that the United States has depleted much of its storehouse of basic scientific knowledge. If the U.S. is to remain a leader in agricultural production this storehouse must be replenished. Programs to increase basic research in the plant sciences and human nutrition are underway and will be expanded in 1980 through the competitive grant program in Cooperative Research.

In the animal sciences the "bank" of available basic research is decreasing as more is put into application, as husbandry methods become more intensive, as diseases bypass currently used control technology, and as action agencies remove prophylactic and therapeutic chemicals from our arsenal against disease. Also, the increasing complexity of basic research has driven high the cost of doing basic research. An increased research effort in the basic animal sciences is necessary to achieve breakthroughs in knowledge that can support new and innovative technologies. Congress recognized the need for basic research in the National Agricultural Research, Extension, and Teaching Policy Act of 1977.

Nature of Change: The program in basic animal research is designed to provide a more complete understanding of the biological processes that lead to increased production and control of disease and thereby reduce the costs of animal products to the consumer, reduce the dependency of animal agriculture on drugs, and improve the quality of food from animals and contribute to stabilizing fluctuation in the price of animal products.

Research will be performed extramurally to support and complement inhouse programs and to utilize the capabilities of teams of scientists at the nations colleges and universities. Specific objectives will be:

- a. To understand how animals resist and overcome disease.
- b. By genetically modifying micro-organisms, to allow more efficient digestion of feed, utilization of waste, and production of viral antigens which can be used as vaccines against disease.
- c. To identify and control physiological mechanisms responsible for estrus, ovulation, broodiness, fertilization, embryo survival, and sex control.
- d. To determine how nutrients, hormones, and enzymes affect feed consumption and, at the cellular level, affect milk, egg, and tissue synthesis.
- e. To understand the chemical, physical, and microbial intestinal environment needed for optimum digestion and absorption and speed up the rate limiting steps in the growth process.

- (c) An increase of \$1,950,000 for research on energy (\$448,000 available in FY 1979).

Need for Change: The Nation faces a serious and continuing energy supply problem. Agriculture can help solve the problem by becoming more energy self-sufficient through the substitution of renewable and noncritical energy sources for petroleum and by producing crops for energy.

Essentially all of USDA's energy research, development, and demonstration activities are parts of other programs or are funded by other agencies. Greater emphasis must be given to the development of information and technology on alternative energy applications and the production of energy crops if Agriculture is to contribute significantly and rapidly to the solution of the energy problem.

In Title XIV of the Food and Agriculture Act of 1977, Congress authorized the Secretary of Agriculture to make energy an integral part of agricultural policy. Solar energy competitive grants, model farms and demonstration projects, and regional research and development centers were specifically authorized.

Nature of Change: The proposed funding would provide for the establishment within existing facilities, of two Federally operated solar energy research and development centers. The programs of the Centers will be conducted both in-house and through contracts and grants to State Agricultural Experiment Stations and others. Prompt transfer of energy technology to USDA action agencies and users will be assured through an Extension component at the Centers. The concentration of scientific and engineering talent at the Centers will provide for more effective coordination of USDA and other agency programs on solar energy as related to agriculture.

Specific areas identified for research and development are:

- Solar heating of livestock shelters
- Generation of methane from animal and crop residues
- Wind energy for dairy and other livestock facilities
- Small scale fuel alcohol production in connection with animal production units where use may be made of waste heat and spent grain.

- (d) A decrease of \$4,146,000 from current funding for research projects that are considered non-essential to meet the Nation's agricultural and consumer needs (\$44,564,000 available in FY 1979).

Need for Change: The decreases proposed in FY 1980 reflect the Department's policy to emphasize and fund only research projects now regarded as most essential to the Nation's agricultural and consumer needs. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1980 Budget given the Federal Government's commitment and need to reduce spending and inflation. In the development of the 1980 Budget and through the "Zero Base" approach, numerous research projects have been identified as not now meriting support by Federal funds. A number of questions have been applied in the process to determine these items, such as:

- Is research essentially completed?
- Is work being duplicated?
- Are further significant results attainable in the near future?

- Can we more efficiently do research elsewhere?
- Can some other organization handle and assume research?
- Is the activity essential to the Nation's agricultural and consumer needs?

In an effort to reduce spending and inflation and meet critical national needs the following animal research projects are proposed for reduction.

Project

Nature of Change: Equipping Regional Veterinary School at Virginia Polytechnic Institute (VPI) - \$1,250,000. Federal assistance for initial staffing and equipping the regional veterinary school at VPI is being provided in FY 1979 and would not be continued in FY 1980. In addressing this item, the Conference Report on the 1979 appropriations Act stated that the appropriation of these funds do not constitute a commitment for funding in future years.

Dairy Forage Research Center-\$506,000. Plans for staffing and operating the North Central Dairy-Forage Research Center at Madison, Wisconsin and at other "cluster" locations are being reconsidered in light of Congressional and Presidential concerns regarding increasing federal employment and economic circumstances. Limited staffing for program planning and direction are planned for fiscal year 1979. Transfers of existing personnel and resources to staff these locations is being considered.

Contagious Equine Metritis Research-\$500,000. At this time the disease is confined to the state of Kentucky and the extent of danger appears not as great as initially feared. More information will be known after the foaling season this Spring. Studies currently underway in Kentucky and those planned should provide sufficient knowledge of potential threat to the equine industry of the United States without continuation of Federal funding.

Other Animal Production and Disease Research Being Reduced-\$1,890,000.

Shipping fever and range management	\$45,000
Beef forage crop residue study	60,000
Use of fats in energy	265,000
Predator control	99,000
Handling animal wastes	382,000
Equipment for work methods for livestock production	113,000
Lagoon performance	5,000
Livestock stress during marketing	60,000
Farm electric equipment	54,000
Swine abscesses	240,000
Equine piroplasmiasis	433,000
Heating by wind energy	17,000
Corn production under heat stress	117,000



Nature of Change: Those projects proposed for reduction were evaluated and identified through criteria mentioned above in "Need for Change". Final determination was made that funding these projects was unnecessary to support priority national needs and that the funds proposed in the 1980 Budget are sufficient to carry out an intensive and responsive research program. The programs recommended in 1980 stay within necessary economic constraints while providing for new or increased emphasis in areas of priority concern.

Despite the proposed reductions, there will be no decrease in the quality of ongoing research required to support priority agricultural and consumer needs.

- (e) A decrease of \$389,000 in research to improve rural communities (\$389,000 available in FY 1979).

Need for Change. Under this program, research was conducted on (1) house design, (2) structural components, (3) construction techniques for "do-it-yourselfers", (4) insulating methods, (5) greater use of solar and wind energy, and (6) rural water and waste systems. This has been a very small research program over the past several years (4 scientist years). Other Departments and institutions are now committing substantial resources to similar programs that could easily replace the research being conducted under this program.

Nature of Change: The decrease eliminates research on rural house construction in the Science and Education Administration.

2. A net decrease of \$4,282,000 for research on plant production consisting of:

- (a) A decrease of \$253,000 for reduced travel.  
An increase of \$127,000 for FY 1979 pay increases.
- (b) An increase of \$2,800,000 for research on energy (\$691,000 available in FY 1979).

Need for Change: The Nation faces a serious and continuing energy supply problem. Agriculture can help solve the problem by becoming more energy self-sufficient through the substitution of renewable and noncritical energy sources for petroleum and by producing crops for energy.

Essentially all of USDA's energy research, development, and demonstration activities are parts of other programs or are funded by other agencies. Greater emphasis must be given to the development of information and technology on alternative energy applications and the production of energy crops if Agriculture is to contribute significantly and rapidly to the solution of the energy problem.

In Title XIV of the Food and Agriculture Act of 1977, Congress authorized the Secretary of Agriculture to make energy an integral part of agricultural policy. Solar energy competitive grants, model farms and demonstration projects, and regional research and development centers were specifically authorized. In the Emergency Agricultural Act of 1978, Congress authorized the use of set-aside acreage and incentive payments for production crops as energy feedstocks.

Nature of Change: The proposed funding would provide for the establishment within existing facilities, of two Federally operated solar energy research and development centers. One of the centers would be in the South for warm season crops and one in the North for crops suitable for cool climates. The programs of the Centers will be conducted both in-house and through contracts and grants to State Agricultural Experiment Stations and others. Prompt transfer of energy technology to USDA action agencies and users will be assured through an Extension component at the Centers. The concentration of scientific and engineering talent at the Centers will provide for more effective coordination of USDA, and other agency programs on solar energy as related to agriculture.

Specific areas identified for research and development are:

- Screening, evaluation, and production practices for energy crops which may be grown in the USDA-administered set-aside program and on other acreages.
- Solar heating of greenhouses
- Wind-powered irrigation systems and refrigerated crop storages
- Gasification of biomass for the operation of engines for irrigation pumping and for crop drying.

- (c) An increase of \$2,500,000 for integrated pest management (IPM) research (\$3,100,000 available in FY 1979).

Need for Change: The costs to producers and consumers of chemicals used to control pests tripled between 1967 and 1975 to \$2.4 billion. The use and costs of chemical control methods are still increasing. Despite use of pesticides and other current control methods, the reduction of potential agricultural yield and quality due to pests is about 30% or \$20 billion annually.

Examples of losses include \$2.5 billion by weeds in 7 grain crops, \$2.2 billion by overwintering migratory insects, and \$1 billion by foliar or soil borne pathogens and nematodes. Several recent national and international studies emphasized the need to reduce such losses. A holistic or systems science approach is needed to increase the reliability and efficiency of high yielding crop production-protection systems to compensate for decreasing introduction of new pesticides, loss of current pesticides by regulatory actions, rising costs of pest control, geographical spread of hard-to-control weeds, insects, and diseases, and crop management techniques such as conservation tillage.

Environmental concerns emphasize the need for IPM in order to reduce losses caused by pests, reduce costs of pest control, reduce environmental insult and optimize profits from superior production and pest management systems in broad ecological zones for producers, home owners and the public generally. Specifically, the focus of IPM thrusts in Agricultural Research will be on research and development of IPM systems and predictive models. Development and integration of pest control components against selected migratory insects, aquatic and small grain weeds, and plant diseases that are applicable to broad ecological zones will be increased and 1-2 pilot tests to integrate various control technologies into systems of national significance will be initiated.

Nature of Change: Additional funds requested for FY 1980 would provide for the development and evaluation of promising new methods of managing weeds, plant diseases, nematodes, ecologically selective chemicals, resistant varieties, genetics, crop rotation, and behavior modifying chemicals. This increase would also provide for the development of pest population and migration forecasting systems. In addition, the proposed funds would enable us to combine control and prediction technologies into integrated pest management systems for specific pests and pest complexes. Specific projects include; migratory insect pest (fall army worm), wild oats and aquatic weeds, biological control of fungi, vectors of bluetongue, biological control of mosquitoes, and pilot projects to evaluate large scale IPM systems.

- (d) An increase of \$500,000 for research on germplasm (\$500,000 available in FY 1979).

Need for Change: The Department is requesting funds to provide for construction, and operation of national fruit and nut germplasm repositories. Funds previously available for this program were provided again in FY 1979 but were included in the Agency's construction Account. Because funds in that account are non-recurring and not available in FY 1980, it is necessary to request these funds as an increase.

Nature of Change: The proposed funds would permit the Agency to continue its plan of constructing and operating national fruit and nut germplasm repositories. These repositories are required to maintain and preserve valuable fruit and nut germplasm and make such germplasm readily available to plant breeders and plant scientists.

- (e) A decrease of \$9,956,000 from current funding for research projects that are considered non-essential to meet the Nation's most pressing agricultural and consumer needs (\$127,574,000 available in FY 1979).

Need for Change: The decreases proposed in FY 1980 reflect the Department's policy to emphasize and fund only high priority research projects essential to the Nation's agricultural and consumer needs. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1980 Budget given the Federal Government's commitment and need to reduce spending and inflation. In the development of the 1980 Budget and through the "Zero Base" approach, numerous research projects have been identified as not being of highest current national concern and thus not appropriate for Federal fund support. A number of questions have been applied in the process to determine these items, such as:

- Is research essentially completed?
- Is work being duplicated?
- Are further significant results attainable in the near future?
- Can we more efficiently do research elsewhere?
- Can some other organization handle and assume research?
- Is the activity essential to the Nation's agricultural and consumer needs?

In an effort to reduce spending and inflation and meet critical national needs the following plant research projects are proposed for reduction.



Nature of Change: Staffing and Equipping the Appalachian Fruit Research Station at Kearneysville, West Virginia - \$1,100,000. Plans for staffing and operating this research center must be reconsidered in light of Congressional and Presidential concerns regarding increasing federal employment and economic circumstances. Limited staffing for program planning and direction and the center is occurring in fiscal year 1979. Transfer of existing personnel and resources to staff this location is being considered. It is anticipated that this can be done without the funds now proposed for deletion.

Tobacco Production Research - \$1,048,000. The 1979 Budget Estimate proposed a decrease in tobacco production research in the amount of \$3,106,000. During Congressional review and evaluation, it was considered that a significant portion of this tobacco effort could be properly defined, and/or modified to emphasize the safety aspects of tobacco research.

The Department has determined that \$2,058,000 of current tobacco effort can be modified to emphasize health and safety related aspects of tobacco research. Therefore, the 1980 Budget reflects a redirection in the current fiscal year 1979 of \$2,058,000 to the Human Health and Safety program. These funds were formerly classified under the Crop Production Efficiency program.

The balance of tobacco research \$1,048,000 is considered primarily tobacco production oriented and is recommended for elimination in the 1980 Budget.

Cotton Production - \$869,000. The relationship between federally supported research on cotton production and the economic value of the crop is disproportionate relative to the need and economic value of other major agricultural products. Given the need to address other national priorities the Department recommends termination of the following research studies.

Cotton breeding	247,000
Harvest Aid for cotton	126,000
Cotton fibers	243,000
Cotton pathology	74,000
Flowering response of cotton	108,000
Photosynthate of cotton plants	71,000

Federal support of other ongoing cotton production research will be maintained at about a \$4 million level.

#### Other Plant Production and Disease Research Being Reduced

Potato disease	212,000
Fungi evaluation	71,000
Aircraft in applying use for	
Agricultural materials	155,000
Physics of particle transport	191,000
Chalk brood disease	100,000
Soybean pollination	100,000
English walnuts	150,000
Range management	100,000
Sugar cane smut	357,000
Beef forage crop residue study	60,000
Sugar cane production	450,000
Greenhouse/headhouse at	
Stillwater OK	170,000
Dairy forage cluster	394,000
Soybeans	24,000
Wheat quality	100,000
Peas and lentils	100,000
Pickles, Onions and carrots	30,000
Herb Garden	200,000
Shipping fever/range management	35,000
Forage crops-range	105,000
High Plains Grassland Research	150,000
Hay and pasture grasses	14,000
Improved crop variety studies	1,572,000
Reduce production cost studies	2,099,000

Those projects proposed for reduction were evaluated and identified through criteria mentioned under Need for Change. Final determination was made that funding these projects were not highly essential to the support of priority national needs. The programs recommended in 1980 stay within necessary economic constraints while providing for new or increased emphasis in areas of highest priority concern.

Despite the proposed reductions, there will be no decrease in the quality of ongoing research required to support priority agricultural and consumer needs.

3. A net increase of \$2,651,000 for research on conservation and use of soil, water and air resources consisting of:
  - (a) A decrease of \$121,000 for reduced travel.  
An increase of \$40,000 for 1979 pay increases.
  - (b) An increase of \$2,000,000 for nonpoint source pollution research (\$6,260,000 available in FY 1979).

Need for Change. Federal action and regulatory agencies in cooperation with State and local planning agencies have been directed by Congress through the Federal Water Pollution Control Act of 1972, the Rural Clean Water Act of 1978, and the Resource Conservation Act of 1977, to develop programs to reduce nonpoint source pollution, and to assess the impact of such programs on the quality of the Nation's surface and subsurface waters.

One way to implement water quality programs is to monitor each watershed and prescribe corrective measures when pollution is judged to be excessive. A more feasible alternative is to develop accurate mathematical models to predict the effect of different management practices so that farmers and land use planning groups can select the Best Management Practices (BMP's) for each farm and watershed. Before this can be done, however, we need better ways to characterize the behavior of water intake, storage in soils, and runoff on a field and watershed basis. This research is essential to underpin the Department's ongoing and planned programs for protecting and improving water quality.

Nature of Change. If successful, this research will provide a framework for using the extensive soil classification data base developed by the Soil Conservation Service (SCS) for evaluating management practices as they effect runoff, erosion, and chemical transport. In cooperation with SCS, procedures will be developed by SEA scientists to improve the hydrologic classification of soils using soil morphologic and taxonomic data from standard soil surveys. Grants will be made to universities or foundations as needed to stimulate fundamental research aimed at improving our understanding of the factors that affect the intake and redistribution of water within the soil profile. Specific objectives will be:

- a. Evaluate the effects of cultural practices, flora and fauna, surface roughness, and water application methods on the hydraulic properties of soils.
  - b. Develop a hydrologic classification of soils based on soil morphology and taxonomy.
  - c. Evaluate the effect of the point-to-point variability in soil properties on the movement of water, sediment, and agricultural chemicals.
- (c) An increase of \$2,200,000 for Aerospace technology research (\$651,000 available in FY 1979).

Need for Change. Crop losses from unfavorable weather cost the U.S. over \$8 billion annually according to one estimate. Lack of adequate data for commodity production forecasts leads to market fluctuation and uncertainty. Conservation programs are hindered by shortcomings in data development. Aerospace technology has the potential to provide information on early warning of changes in crop and land conditions, on commodity production forecasts, on land use, on resource and conservation inventory and assessment, and on pollution monitoring and impact. These are of major importance to the Department and the Nation.



The administration has mounted a multiagency "Initiative on Applications of Aerospace Technology to Agriculture." Several agencies in USDA will cooperate with NOAA and NASA to develop information on the highest priority issues of early warning of changes affecting crop production and commodity production forecasts. SEA has been assigned the task of providing a large part of the research inputs to this Initiative, and other USDA agencies will provide inputs as appropriate to their missions.

Successful application of aerospace technology will expedite data collection and handling, will help stabilize the production and price of major crops on the world market regardless of weather conditions, will improve the competitiveness of U.S. farm products in world markets, and will assist action and regulatory agencies in the implementation and monitoring of action programs. (These same data will be useful for implementing programs to assess water and wind erosion hazards and implementing integrated pest management systems.)

Nature of Change. SEA's role in this Initiative is to develop new or improved crop growth models which will quantify the effects of weather, soil, and other variables on crop yields. Inputs to these models will include data obtained from satellites and aircraft as needed and as appropriate. Early results indicate that the effects of drought on wheat yields can be measured from aircraft. This research will be done mainly inhouse using existing facilities and expertise but cooperating scientists will be involved through extramural programs as needed. Emphasis will be placed on wheat, soybeans, and corn, but other major crops and range will be considered as appropriate.

- (d) A decrease of \$1,468,000 from current funding for research projects that are not considered highly essential to meet the Nation's agricultural and consumer needs (\$14,643,200 available in FY 1979).

Need for Change. The decreases proposed in FY 1980 reflects the Department's policy to emphasize and fund only high priority research projects essential to the Nation's agricultural and consumer needs which are not likely to be funded otherwise. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1980 Budget given the Federal Government's commitment and need to reduce spending and inflation. In the development of the 1980 Budget and through the "Zero Base" approach, numerous research projects have been identified as being less than high priority. A number of questions have been applied in the process to determine these items, such as:

- Is research essentially completed?
- Is work being duplicated?
- Are further significant results attainable in the near future?
- Can we more efficiently do research elsewhere?
- Can some other organization handle and assume research?
- Is the activity essential to the Nation's agricultural and consumer needs?

In an effort to reduce spending and inflation and meet critical national needs, the following projects are proposed for reduction:

<u>Projects</u>	<u>Amount</u>
Beef forage and crop residue study.....	\$ 30,000
High plains grasslands research.....	100,000
Damages and affects of salt.....	230,000
Cause and control of saline seepage.....	108,000
Water management.....	711,000
Soils research (fertilization, movements).....	289,000

Nature of Change. Those projects proposed for reduction were evaluated and identified through criteria as mentioned above. Final determination was made that funding these projects was unnecessary to support priority national needs and that the funds proposed in the 1980 Budget are sufficient to carry out an intensive and responsive research program. The programs recommended in 1980 stay within necessary economic constraints while providing for new or increased emphasis in areas of priority concern.

Despite the proposed reductions, there will be no decrease in the quality of ongoing research required to support priority agricultural and consumer needs.

4. A net decrease of \$7,837,000 for research on processing, storage, distribution and food safety consisting of:

- (a) An increase of \$74,000 for FY 1979 pay increases.
- (b) An increase of \$1,000,000 for urgent research on nitrite (\$1,100,000 available in FY 1979).

Need for Change. The centuries old practice of using nitrite to preserve and to color and flavor cured meats, poultry and fish has become a source of intense public controversy and scientific debate for the past decade. Scientists have found that nitrite can combine with certain natural constituents of meats to form nitrosamines, a family of chemicals known to produce cancer in laboratory animals.

Very recently, nitrite itself has become suspect as a carcinogen. Recent studies sponsored by the Food and Drug Administration indicate that nitrite produces cancer of the lymphatic system in test animals. The nitrite issue is thus a national health and safety problem with major economic implications. The Federal Government is now considering the possibility of banning the use of nitrite in cured meat products. Regulations could become effective within 12 to 15 months of such a decision. About one-half of the pork and one-fourth of the beef supply is marketed as cured products. Approximately 18 percent of the 222 pounds of meat, poultry, and fish consumed in the average American diet comes from pork products processed with nitrites. These nitrites processed pork products, valued at approximately \$10 billion are strongly preferred by many consumers and add variety to food choice. A ban of nitrites without suitable substitutes would result in a substantial impact on consumers as well as the pork industry. USDA research is required to undergird regulatory actions to assist in developing an alternative to nitrite. The Department of Agriculture must be in a position to develop regulations based on credible scientific evidence.

Nature of Change. Additional funding is necessary to intensify research efforts to find an alternative for nitrite in cured meat and meat products. The research strategy is based upon (1) continuing the high priority research effort to develop procedures that will reduce or eliminate nitrosamines formed in cured meat, particularly bacon, and (2) increasing the research emphasis on developing alternative process in nitrite substitutes. The proposed funds would be used to:

- Develop chemical substitutes for nitrite.
- Determine mode of action of nitrite on botulism.
- Improve processing techniques.
- Obtain additional studies on anti-botulism agents.
- Safety test new compounds.

Inhouse research on these problems will be accelerated by contracting complementary phases with qualified institutions.



- (c) An increase of \$2,400,000 for basic and expanded human health and safety research (\$14,553,000 available in FY 1979).

Need for Change. The health and safety of humans engaged in the production, handling, and utilization of farm products and of consumers in general can only be assured by systematic elimination of those deleterious materials (toxins, carcinogens, teratogens, hormones, heavy metals, antibiotics, and the like) they may contain as a result of natural processes or introduced by farm and off-farm operations now commonly used. Emphasis must be given to the continued development of non-destructive analytical procedures that will provide for the rapid monitoring of the safety of foodstuffs without product loss; the study of the routes through which undesirable materials enter the food chain, and the development of methods to eliminate contamination or hold it to minimum and safe levels.

Nature of Change. The additional funds would be used to increase the rate at which basic research, now underway in Agricultural Research, will produce results that aid in the solution of problems confronting people who are charged with the assurance of the safety and wholesomeness of foods and feeds. Specific areas identified for research are:

- Infections of animals which are transmissible to human.
- Salmonella in animal production and animal products.
- Development of fast, non-destructive methods for determining the amounts of unsafe material in food and feed.
- Reduction of grain contamination by poisonous plant materials.
- Isolation, identification and control of natural toxicants in new cultivars of vegetables and fruits.
- Study of ligand (binding) complexes in organic soils and their affect on release on heavy metals in the environment.

Funds will be used primarily to contract for unique research services outside the sphere of the USDA's expertise and facilities, and to procure and develop scientific technology necessary for transferring the research findings to practice. The problems to be dealt with by these actions involve recycling wastes through the soil; contamination of grain by weeds, grading, handling, and consuming red meats and poultry; and breeding better varieties of vegetables and fruits.

- (d) A decrease of \$11,311,000 from current funding for research projects that are considered not highly essential to meet the Nation's agricultural and consumer needs and not appropriate for federal funding (\$56,578,000 available in FY 1979).

Need for Change. The decreases proposed in FY 1980 reflect the Department's policy to emphasize and fund only high priority research projects essential to the Nation's agricultural and consumer needs and not likely to be otherwise funded. This has been a major concern of the USDA in past years and has become even more critical in the preparation of the 1980 Budget given the Federal Government's commitment and need to reduce spending and inflation. In the development of the 1980 Budget and through the "Zero Base" approach, numerous research projects have been identified as being less than high priority. A number of criteria have been applied in the process to determine these items, such as:

- Is research essentially completed?
- Is work being duplicated?
- Are further significant results attainable in the near future?
- Can we more efficiently do research elsewhere?
- Can some other organization handle and assume research?
- Is the activity essential to the nation's agricultural and consumer needs?

In an effort to reduce spending and inflation and meet critical national needs, the following projects are proposed for reduction:

Project

Nature of Change:

Wool and Mohair \$1,224,000

Synthetic fibers have replaced wool and mohair in many consumer apparel and household markets during the past decade and the need to continue this research at the current level, therefore, has declined. When compared to other agricultural products, wool and mohair utilization research is receiving a disproportionate share of available resources. Given the need to address other National priorities the Department recommends reduction of this research.

Alcohol Fuels \$500,000

The Department agrees that a priority need exists to do additional research in the area of providing alternative sources of fuel from agricultural products. For fiscal year 1980, the Department is proposing a significantly increased research program aimed at making agriculture more energy efficient in its operation by substitution of renewable and non-critical energy sources of petroleum and by the production of energy from biomass, including agricultural residues and wastes. The proposed increased effort of \$2,800,000 is broader in scope than the current program and will more than offset the termination of this research program and will provide for continuation of the important aspects of the alcohol fuel program.

Other Post Harvest Technology Research Projects Being Reduced \$9,587,000

In the 1979 President's Budget \$9.4 million of post harvest technology research was proposed for termination or reduction. Congress approved part of the reduction and the Conference Report stated that "the Conferees will expect the Department to continue to work toward the objective of shifting some work to private industry or to being funded by private industry where appropriate." The Department has continued to examine the activities in post harvest technology area and recommends termination or reduction of the following projects:

<u>Projects</u>	<u>Amount</u>	<u>Projects</u>	<u>Amounts</u>
Food products' quality and acceptability.....	\$1,313,000	Improved process (tomato, vegetables, citrus).....	\$ 236,000
Fruit quality retention.....	158,000	Dehydrated sweet potato...	102,000
Water chestnuts.....	30,000	Whey components in food/feed.....	132,000
Insect control.....	235,000	Whey components properties/products.....	358,000
Animal feed.....	166,000	Processing field crops....	67,000
Cottonseed protein concentrates.....	45,000	Aquaculture - efficient feed utilization.....	100,000
Lactose oxidation.....	183,000	Processing animal and animal products.....	606,000
Develop high quality potatoes.....	73,000	Poultry, dairy, egg and meat facilities and handling.....	786,000
Process development of peanut flours.....	51,000	Industrial uses of farm products.....	2,820,000
Pickles, onion and carrots..	30,000	Technologies for fiber uses.....	734,000
Shipping fever and range management.....	45,000	Marketing livestock and animal products.....	150,000
Cotton dust research.....	100,000		
Food colorants.....	183,000		
Technologies for industrial uses.....	409,000		
Marketing horticultural crops.....	205,000		
Marketing technology and facilities.....	270,000		

5. An increase of \$3,762,000 for research on human nutrition consisting of:

- (a) An increase of \$12,000 for FY 1979 pay increases.
- (b) An increase of \$1,750,000 for human nutrition research (\$22,008,000 available in FY 1979).

Need for Change. Historically a major goal of USDA has been to assure an adequate food supply for the nation. It is increasingly apparent that an adequate food supply does not assure an adequate diet. In order to improve the dietary and nutritional status of mankind knowledge is needed on nutrition requirements, food preferences and habits, nutrient composition of foods, and techniques and equipment to guide consumer selection of food.

Title XIV of The Food and Agriculture Act of 1977 emphasises the need for more nutrition research and designates USDA as the lead Federal Agency. Nutrition educators need information about food habits, choice and motivations in order to assist consumers in making nutritious food selections. Additional data on the nutrient composition of foods will be developed to supplement tables currently available, and expand the Nutrient Data Bank. Nutritionists require this data to translate nutritional needs into food selection and food selection patterns. In addition to knowledge of what constitutes nutritionally adequate diet, consumers need guidance on how to convert available foods into appealing nutritious meals.

Nature of Change. Research will be conducted extramurally to augment or supplement and strengthen inhouse programs using expertise, facilities, and equipment at universities, in the private sector or in other research agencies. The work will be consistent with SEA missions and National Programs. Proposals will be solicited, and selections will be made, on the basis of utilizing the best facilities and expertise in the U.S.

The major thrust in this program will be the development of up-to-date information and guidance materials for nutrition educators and consumers to improve the nutritional status of the American people through diet. The proposed increase would provide for: (a) increasing the cost-effectiveness and speeding up the achievement of the targets of the Nutrition Composition Laboratory (development of analytical methods and analyses); (b) provide an expansion of the Nutrient Data Bank, and allow the acquisition of needed data on nutrient content of meats, and fresh fruits and vegetables. This would help to identify and appraise the nutritional properties and contributions of foods including the study of fresh and processed foods; (c) assess bioavailability and chemically useful forms of nutrients in foods; (d) and determine and evaluate nutritional antagonists in foods.

- (c) An increase of \$2,000,000 for the Human Nutrition Center at Tufts University, Boston, Massachusetts.

Need for Change. Technology, medical science, improved diets and changing lifestyles have contributed to longer life spans for Americans. A critical need exists for more knowledge on the nutritional needs of the aged. In fiscal year 1979 Congress provided funds for the construction of a USDA regional research center in Boston, Mass. The research program of the nutrition center will be concerned with the influence of nutrition on those attributes which have implications for aging persons. They include the potential for longevity, resistance to disease, and intellectual maturation and function. The objective of the research will be to identify nutrition factors which will optimize the expression of the genetic potential. The information gained will broaden understanding of the aging process and the role nutrition plays in that process. It is expected that new knowledge will make it possible to prevent or at least decrease morbidity caused by disease associated with aging.



In order to most effectively utilize the facility it is essential that program development begin and initial staffing take place before construction is completed.

Nature of Change. The funds requested would provide staffing necessary to develop an interdisciplinary research program which will result in new knowledge of the role of nutrition in aging before the facility is completed. Their efforts will also serve as the foundation on which more extensive and indepth research programs will develop in the completed and fully occupied center.

This initial program on issues which are believed to be highly relevant and of immediate concern. Some of these issues are: (1) the nutritional requirements of aging person; (2) the influence of nutrition on the aging process; (3) the role of nutrition in degenerative disease associated with aging. Particular attention will be given to skeletal and dental disorders, neuromuscular, ocular, and brain disorders, gastrointestinal disorders, atherosclerotic vascular disease, and disease of metabolism; (4) the role of nutrition in immunity; (5) the role of nutrition in the cause and prevention of cancer; (6) the role of nutrition in detoxification; (7) the availability of nutrient in foods for intestinal absorption, particularly as affected by aging.

The approaches used in the research will include the study of human volunteers living in the community and living under metabolic ward conditions in the clinical research center of Tufts Medical Center. In addition studies utilizing experimental animals models will be done.

During this first year the beginnings of the clinical team will be brought together and a clinical nutritional laboratory for measurement of nutrient and other substances in samples obtained from human volunteers will be initiated. Senior scientists necessary for leading various aspects of the research program will be recruited and they will begin to gather their staffs together. A cooperative research endeavor will be initiated on some of the issues noted above with scientists at Tufts University School of Medicine and other universities in the area, where mutual research interests are identified.

## STATUS OF PROGRAM

The Agricultural Research (AR) component of the Science and Education Administration is concerned with mission-oriented research to ensure an abundance of high-quality, nutritious, reasonably priced food and other agricultural products to meet the needs of an expanding domestic and world economy while maintaining environmental quality. AR uses coordinated, interdisciplinary approaches to conduct basic, applied, and developmental research in the fields of livestock, plants, soil-water-and-air resources, environmental quality, energy, processing, storage and distribution efficiency, food and nutrition, consumer service, international development, and agriculturally related health hazards, including food safety.

Research is conducted at more than 150 locations in the States, Puerto Rico, Virgin Islands, and several foreign countries. Much of the research is conducted in cooperation with the State agricultural experiment stations, other State and Federal agencies, and private institutions.

## RESEARCH ON ANIMAL PRODUCTION

Current activities: Research is conducted to improve the efficiency of producing high quality animals and animal products through improved genetic and reproductive capacity, improved feeding and management practices, increased use of feed sources not eaten by man, improved design and use of equipment, and more efficient use of energy. The goals are also accomplished through preventing and controlling diseases caused by infectious microbes, parasites, insects, and other pests and chemical and natural toxicants.

As the production of animals and animal products continues to increase in the United States and the world, new technology is needed to enable livestock producers to increase production and thus to assure a reliable supply of animal protein while, at the same time, reducing production costs. Special attention is being given to the physiology of reproduction and sperm preservation, the formulation of diets and development of management practices that will reduce energy use and conserve the environment, production practices that alter the composition of animal products for the benefit of consumers, agents which cause disease and the animal's response to disease agents, and fundamental research. Research is also being conducted to develop methods of controlling, through environmentally safe practices, pests and diseases which cause major economic losses or which are infectious for man.

### Selected examples of recent progress:

Two New Technologies for Tick Control. The development of hybrid sterility between the two species of cattle fever ticks offers an opportunity for developing a nonchemical control or eradication technology in areas where only one of these species exists, such as Puerto Rico. Vegetative management, essentially permitting the appropriate amount of sunlight to strike grassland, has proved extremely effective in Oklahoma for reduction of Lone Star tick populations. Tick reductions of 90 percent have been shown in areas that have been cleared of excess brush and vegetation. Vegetative management probably will become a major factor in an integrated pest management system of this serious pest of cattle and people.

Major Disease Cause of Reproductive Failure in Swine is Found. Porcine parvovirus has been found to be the major infectious cause of reproductive failure in swine. A study of reproductive tracts of sows obtained at slaughter revealed a high incidence of porcine parvovirus in dead embryos and fetuses. From the results of this study, it was estimated that the annual economic loss to the U.S. swine industry due to parvovirus may be \$45 million.

New, Long-Acting Formulation of Oxytetracycline is Developed That Eliminates the Carrier State of Bovine Anaplasmosis. Twelve carriers of *Anaplasma marginale* were cleared of the parasite by injection of a new formulation of the antibiotic, oxytetracycline. Two injections given 7 days apart were effective. Previously, treatment with this drug required 12 daily injections for similar results. In addition, the new formulation apparently caused no discomfort to the animal and resulted in no visible tissue irritation. Clearance of the new formulation by FDA for use in cattle will greatly reduce the labor, expense, and difficulty in treating infected animals.

Feed and Food Additive Shown to Have Antiviral Activity Against Newcastle Disease Virus. Butylated Hydroxytoluene (BHT) reduces the infectivity of Newcastle disease virus (NDV) in vitro, and reduces the severity of Newcastle disease in vivo. Viral infectivity was reduced approximately 99 percent when Newcastle disease virus was exposed in a test tube to 20 ug/ml of BHT. Chickens fed diets containing 200 ppm BHT had reduced mortality and fewer of them produced antibody after exposure to virulent and avirulent NDV. These findings suggest a new direction for development of antiviral therapy and also suggests a possible explanation for the occasional failure of live NDV vaccines to immunize chickens.

Animal Waste Shows Promise As a Source for Methane Gas and Feed Nutrient Recovery. Research on anaerobic fermentation using beef cattle manure as input materials is being conducted at Clay Center, Nebraska, to develop basic digester design criteria. Methods of obtaining rapid build-up of gas production within 9 days after startup have been developed. Preliminary results of feeding trials using dried centrifuge cake of the digester showed that the solid increments of the fermentor residues were palatable in the ration of an animal. The liquid effluent, when mixed with corn and hay, was also found to be utilizable in a manner that is comparable to soybean protein.

A New, Experimental Killed-Virus Vaccine Against Bluetongue. Development of a killed vaccine for bluetongue disease has resulted in discovery of an unexpected mechanism for protection. Sheep were solidly protected from the disease-producing virus without showing neutralizing antibodies in their blood. The solid immunity was attributed to the induction of an unusually strong immunity generated by special cells of the sheep. The new vaccine was produced by growing the virus in tissue culture and inactivating or killing it with a chemical called binary ethylenimine. It was then mixed with an oil which serves to enhance the duration of immunity. Studies are continuing on this major breakthrough.

Factors Affecting Calving Difficulty Identified. Difficult calving is a serious problem to cattlemen because of associated calf death losses, some cow deaths, and reduced subsequent reproductive efficiency of cows experiencing difficulty. It is a greater problem in young than in mature cows. Within cow age, birth weight of calves is a major predetermining factor, with conformation or other genetically determined calf characteristics also being important in some situations. Attempts to reduce calving problems by controlling nutrient intakes of cows during gestation have not been successful.



Production Superiority of Cows Milked Three Time a Day Increases Over Time. Three milking frequencies were compared to determine effects on milk yield, milking time and residual milk. Three groups of cows were milked: twice a day; three time a day until yields fell below 68 lbs. of milk per day; and three times a day until yields dropped below 53 lbs. per day. Percentage superiority of cows milked three times a day increased from about 4 percent at peak yield to more than 20 percent just before being switched to twice a day at 152 days. In spite of a small initial drop after changing to twice a day, there was a strong and long-lasting positive carryover effect from three times a day milking. This indicates that the additional stimulation and milk removal associated with the three times a day milking caused a semipermanent change in milk secretion rate. Also, slightly less mastitis and discard of antibiotic contaminated milk was associated with cows milked three times a day. Milking three times a day instead of twice a day increased daily milking time by slightly less than the expected 50 percent.

Microencapsulating Insecticides Reduce Dermal Toxicity in Cattle. The insecticides were enclosed within a permeable or semi-permeable envelope and applied as topical sprays. The slow release of the active ingredients reduced the toxicity from 5 to 20 times, when compared to more conventional formulations of the insecticides. Although microencapsulated formulations of these insecticides were designed specifically to control insects attacking crops, the potential use of this innovation could substantially reduce the dermal toxicity in cattle. Thus, improved means of predictive and sustained release of the active ingredient have great potential to improve efficacy of the insecticide and reduce frequency of application.

Abortion in Cattle Linked to Sarcocystis, a Common Parasite of Ruminants. An estimated 20 percent of the cows bred annually in the United States fail to produce living calves. Diagnosis of the causative agent is established in only about 25 percent of bovine abortions. Sarcocystis has been found by SEA scientists to cause abortion in cows under experimental conditions. Although the parasite is found in 75 percent or more of the cattle examined at slaughter, it has not heretofore been implicated as a cause of abortion. A test has been developed to identify Sarcocystis parasites in the tissues of cows. This should aid in the diagnosis of bovine abortions.

Integrated Pest Management of Stable Flies Demonstrated. AR scientists have completed a 3-year study on integrated pest management of the stable fly on the island of St. Croix. Technologies included application of insecticides to breeding sites, use of a pupal parasite, use of an attractant panel treated with an insecticide, and the release of sterile male stable flies. The pest was controlled below the economic threshold on the entire 80-square-mile island. Additional research is required to further develop this integrated pest management system. However, the principles have been successfully demonstrated.

New Vaccine for Roundworms of Swine. Ascaris suum, the large roundworm of swine, continues to be the most widespread and injurious worm parasite of swine the world over. In the United States alone, losses due to this parasite may exceed \$100 million annually. Advances made recently using ultraviolet light to make an experimental attenuated-live vaccine for this disease give strong encouragement to the hope that a practical and effective vaccine will be developed to significantly reduce the number of these parasites in swine.

Increased Risk of the Spread of the Blood Parasite Babesia Caballi in Horses. Of significance to the horse industry is the finding that a strain of the winter horse tick is a suitable vector for Babesia caballi. Previously it was believed that the principal tick vector of this parasite was the tropical horse tick. Because this tick has a very limited range in the United States, the possibility of B. caballi transmission throughout the United States was minimal. The winter tick, on the other hand, is widely distributed in this country. This finding emphasizes the potential hazard of B. caballi to the American horse population and adds urgency and importance to employing measures for controlling the importation of infected horses into the United States

Potential Agent of the Horn Fly. Based on ecological studies of manure-breeding insects, it was determined that a staphylinid beetle offered promise as an effective biological agent for controlling the horn fly and possibly the face fly. This beetle has been studied in the laboratory and is an effective predator on horn fly eggs. Further research is required to fully evaluate the efficacy of this predator. However, the very promising results obtained to date indicate that this biocontrol agent may be an effective part of an integrated pest management system of controlling the horn fly, one of the the most serious pests of cattle in the United States.

Potential Method is Discovered for Early Prediction of Pregnancy and Litter Size in Swine. The establishment of pregnancy in the pig results in dramatic changes in hormones secreted. Experimental results indicate that high concentrations of plasma estrone sulfate appear only when sows are pregnant. The concentration is positively correlated to the number of embryos. Therefore, plasma estrone sulfate may be useful for early diagnosis of pregnancy and predicting litter size in swine.

Optimal Beef Production Systems Shown to Be Dependent on Genetic and Nutritional Resources and Relative Feed Prices. Data accumulated on a wide range of biological cattle types and kinds of rations were used to estimate total nutrients required per unit of product in a Midwestern cow-calf-feedlot management system. Crossbreeding systems utilizing both individual and maternal heterosis, and systems involving large terminal sire breeds were more efficient than purebreeding systems, provided calving difficulty was not an excessive problem. Higher milk production was advantageous so long as available feed quality and quantity permitted normal reproductive rates. Magnitude of advantages of higher milk production and larger size were dependent upon relative costs of total digestible nutrients for the cow herd and for feedlot animals.

New Genetic Engineering System Reduces Costs in Insect Rearing. Research to develop genetic methods of separating the sexes of mosquitoes has resulted in a genetically engineered strain of the malaria vector Anopheles albimanus so that mass rearing of males only is possible. The females are killed with an insecticide in the egg stage and the males survive because they are resistant to the insecticide. Thus when the surviving eggs hatch in the mass rearing facility, only males are being reared. This results in a 50 percent saving in the cost of rearing this species. Other research has indicated the same genetic engineering system can be used to produce an all-male strain of the stable fly (dog fly). The application of this research technology to a number of insect species offers the opportunity to dramatically reduce the cost of insect mass rearing for sterile male programs.

Significant Savings in Utility Costs by Retrofitting Houses to Use Solar Energy for Heating Houses and Domestic Water. SEA researchers retrofitted two existing houses in South Carolina to use solar energy for heating 1,050 sq. ft. of living space and the domestic hot water. The retrofit units were designed to enable construction by rural carpenters or homeowners with some construction ability. During one year, the energy cost for both electrically heated homes was reduced 50 percent, saving the homeowner about \$275 per year for an investment of less than \$3,000.



## RESEARCH ON PLANT PRODUCTION

Current activities: Research is conducted to improve productivity, reliability and quality of food, feed, forage, and fiber crops; florist and nursery crops; rangelands; and turf. Similar work is being done in related areas of tropical and subtropical agriculture. The emphasis is on improved genetic stocks and varieties; optimized yields and quality of crops; improved mechanization and crop production practices; enhanced environmental quality; improved integration of crop protection techniques, including biological and chemical methods of controlling diseases, nematodes, insects, and weeds; and alleviation of the effects of drought and temperature stresses through the development of hardier plants.

New methods of increasing productive capacity through multidisciplinary approaches have been initiated. Special emphasis is being placed on improving basic photosynthetic processes in plants, natural nitrogen-fixing processes in soils and plants, better use-efficiency of both renewable and nonrenewable energy resources, and genetic and chemical regulation of plant growth and development processes.

The quality of our environment can be improved by the development, appropriate use, and care of attractive shelterbelt screening, ornamental trees, shrubs, turf, ground covers, and flowers. An estimated 75 million acres of cropland are affected by wind erosion, the adverse effects of which could be reduced by shelterbelt screening. New and improved methodologies in this area are needed by rural and urban property owners throughout the nation.

### Selected examples of recent progress:

Unique Greenbug Resistant Wheat Germplasm Released. The joint release by SEA and the Oklahoma Agricultural Experiment Stations of "Amigo" germplasm was the result of 13 years of research by a SEA geneticist and SEA entomologists. Amigo was developed by using X-ray on a resistant rye x wheat cross in order to eliminate rye characteristics other than the resistance. Seeds have been distributed widely to breeders in the U.S., as well as some in Europe, Central and South America, Asia, Africa, and Australia. Amigo is the only known source of effective resistance in wheat to the greenbug, a pest that annually costs growers \$40 million or more.

Form-Fill-Seal-Machine for Substantial Increase in Mass Rearing of Boll Weevils is Developed. Mass rearing and sterilization of boll weevils is the key to one part of the multifaceted boll weevil eradication program. The engineering device developed to facilitate mass rearing mechanically feeds plastic from a stock roll through a tray stamping, cutting, filling, and sealing device which results in production of 6 to 10 compartmentalized trays per minute. It fills them with a standardized boll weevil rearing nutrient diet, sprays boll weevil eggs onto the partially congealed diet, covers diet and eggs lightly with sand to aid in keeping them moist, and finally seals the tray with paper. The rearing rate is about 500 weevils per tray. The pilot operation has assured production of at least 5 million adult weevils per week. The adult weevils are released into collection boxes from the sealed trays 14 days after initial deposition of eggs, are fed adult diets for 6 days, sterilized by gamma irradiation, and finally released to the treatment areas in large enough numbers to overwhelm the wild population. This technique is vital to those control methods which depend on large quantities of reared insects.

Development of Fumigation Treatment Results in Removal of Japanese Quarantine Against Importation of Cherries from U.S. Japan has a stringent quarantine prohibiting importation of any fresh pome or stone fruits from any country in which the codling moth is present. Through research by SEA scientists, an effective fumigation treatment has been developed for complete control of codling moth in harvested sweet cherries. Because of this development, Japan has modified its quarantine and has allowed about \$2 million worth of cherries to be imported in 1978.

Sex Attractant of Corn Earworm Identified. Since the corn earworm is the most damaging insect pest of American agriculture, an effective attractant is needed to detect the presence of the pest, to monitor its abundance, and if possible, to suppress the pest by disrupting mating. Through basic research the attractant perfumes (sex pheromone) emitted by the female to attract males have been identified. Several industrial firms have expressed an interest in developing the use of the attractant to manage the pest by disrupting mating.

Use Found for Sewage Sludge in Turfgrass Production. Composted sewage sludge has been used as a soil amendment or growth medium in turfgrass sod production. It has been demonstrated to be an environmental and economically sound method of sludge disposal that could be adapted to commercial sod production.

ELISA Virus Detection in Plants is Demonstrated. It has now been demonstrated that the enzyme-linked immunosorbent assay (ELISA) technique, first developed and used in human medicine, can be successfully used to detect viruses in plants. ELISA has been found to be 100 times more sensitive than conventional techniques for detecting tomato ringspot virus in red raspberry plants and other fruit crops. This new test for the presence of viruses in plants can be completed in a few hours where standard tests take months or even as long as 2 years. The use of this ELISA technique will greatly assist nurserymen in propagating virus-free plants for the homeowner and fruit grower. Since viruses are particularly damaging to fruit crops, it is conservatively estimated that with fruit crops alone, use of the ELISA technique could reduce incidence of field viruses by 60 percent and increase annual farm value by 90 million dollars.

Key is Found to Complete Resistance to Curly Top of Tomatoes. The transfer of complete resistance to curly top virus from wild relatives of tomato into hybrids of crosses between the wild relatives and the cultivated tomato could very well be a major breakthrough in tomato breeding. After 60 years of searching, a permanent, inexpensive, and nonpolluting solution to the curly top disease of tomato seems assured. The resistance is of a simple type and should be easily transferable to any type of tomato. It should open the vast Intermountain West to tomato production where it was once closed by curly top, and eliminate the large annual losses to curly top sustained in the great tomato fields of California.

New Flavonol from Morning Glory Developed for Use as Food Colorant. A stable flavonol was isolated and identified from "Heavenly Blue" morning glory flowers. It is solely responsible for the color of the flowers. It is stable in water solution and appears to be an excellent candidate to replace some of the delisted food additive dyes. By adjusting the acidity, colors were obtained similar to cherry, strawberry, raspberry and grape. A public service patent for its use as a food colorant has been filed.



Mechanism of Selectivity of New Wild Oat Herbicide on Wheat Discovered. A biochemical basis for the control of wild oat and tolerance of wheat to the new herbicide, diclofop-methyl, has been determined. Ring-hydroxylation of diclofop may be the key metabolic reaction that determines how diclofop-methyl kills wild oat without harm to wheat. This knowledge can be used in developing new chemicals or chemical combinations (synergists and antagonists) to increase the efficacy of diclofop-methyl for wild oat control.

New High Yielding, Disease Resistant Soybean Varieties for the U.S. "Franklin", resistant to Race 3 of the soybean cyst nematode, and "Union", resistant to downy mildew and phytophthora root rot, were developed for the southern part of the Corn Belt. "Bedford", resistant to Race 4 of the soybean cyst nematode, was released for the Upper Delta. "Govan", resistant to two species of root-knot nematodes, was developed for the Coastal Plains soils of the Southeast.

New Insect Growth Regulator Developed for Use in Cotton Insect Management Program. The growth regulator, diflubenzuron, whose effectiveness against the boll weevil was first discovered by USDA scientists, has great potential for use in integrated pest management programs, since it is highly effective against the boll weevil and has minimal effect on natural enemies. Its use could reduce insecticide use on cotton by 13 million pounds and increase grower profits by 10 to 25 million dollars. Related benefits can also be expected from the use of diflubenzuron to control gypsy moth, soybean insects, and other pests.

New Sorghum Breeding Lines Reduce Probability of Genetic Vulnerability. New cytoplasm male sterile lines show no effect on yield or other agronomic characters. One new cytoplasmic male sterile source and a maintainer line have been released and distributed to 60 private and public breeders on request. Almost all currently used hybrids are dependent on the milo cytoplasm male sterile system.

Accumulated Leaf Wetness Can be Used as Guide for Spraying Pecan Trees. Research at Byron, Georgia, has shown that by applying fungicides only after each 100 hours of accumulated leaf wetness, one-third fewer sprays have to be applied and pecan nuts are freer of disease than with a conventional spray schedule. The conventional 9-spray per year schedule gave 72 percent disease-free nuts in 1977, but the 6-spray schedule based on 100 hours of accumulated leaf wetness gave 100 percent disease-free nuts. If this new principle were applied throughout the pecan industry, it is estimated that there would be an annual savings of \$6.5 million from reduced use of fungicides, and an additional \$2 million value from increased nut quality.

Protecting Honey Bee Colonies from Toxic Sprays in Cotton. Honey bee colonies survived pesticide sprays in cotton fields during tests in which the bees were confined to the hives. Confinement was for a 24-hour period including the daylight hours of the day that the pesticides were applied. During this period, researchers provided shade for hives, covered each colony with burlap, supplied water within the hive, and provided pollen to feed the confined bees. This method provides a cost-effective alternative to moving colonies away from pesticide-treated areas.

New Kind of Root-knot Nematode Identified in Louisiana. A root-knot nematode heavily damaging all soybean varieties available to Louisiana growers has been found to be a new form. Previously this nematode was thought to be a variant of the common root-knot nematode, but recent laboratory studies have shown that it is different. This finding will aid in the development of resistant soybean varieties or determination of non-host crops which can be used when the nematode is present.

Plant Pathogen Controls Northern Jointvetch, a Serious Weed in Rice. A fungus normally found in the environment has been shown to be effective as a bioherbicide for weed control. The fungus gave more than 95 percent control of northern jointvetch in rice and soybean fields in a 3 year study. The fungus is specific for northern jointvetch and does not injure rice, soybeans, or nontarget crops. The fungus has little or no toxicity to dogs, quail, mallard ducks, bluegill, guinea pigs, rabbits, and rats.

Beetles Introduced from Italy Destroy Stands of Tansy Ragwort in Northern California. Larvae of Longitarsus jacobaeae, which averaged 265 per plant rosette, caused the death of most of that toxic rangeweed at release sites. The beetles were recovered from 60 of 80 release sites in Oregon.

Modern Microbial Genetics Used to develop Genetically Marked Strains of Bacteria Responsible for Biological Nitrogen Fixation in Field-Grown Soybeans. Rhizobium japonicum is the bacteria responsible for the fixation of nitrogen in soybean plants. In order to optimize this symbiotic process and follow the performance of laboratory-engineered bacteria in a soybean field, bacteria with genetic markers have been developed. To measure the competitiveness of R. japonicum strains and inoculum in native soils populated with native strains of nitrogen fixing bacteria, genetically marked strains were prepared. Examination of the nitrogen fixing organs of soybean plants for genetically marked bacteria has enabled our scientists to make unambiguous determinations as to the presence of a laboratory inoculum strain. This will be a valuable tool for investigating methods of enhancing biological nitrogen fixation under field conditions.

Renovation Technique to Recover Overgrazed Mixed Prairie Rangeland With Nitrogen Fertilization. Native range overgrazed for 50 years was returned to a high level of both forage production and livestock response after 2 consecutive years of nitrogen fertilization at 40 pounds per acre of actual N per year, without interruption of grazing use. During the last 10 years of the study, a 30 percent increase in carrying capacity and an additional 100 pounds of gain per animal resulted from the fertilized range, compared to the untreated portion. This management practice is being adopted under actual ranching operations. Several million acres of range, historically overgrazed, in the Northern Great Plains of the United States and the prairie provinces of Canada would respond to this treatment.

Natural Pesticides Discovered in Cotton. The small dark pigment glands that occur below the surface of cotton leaves, stems, and flower buds were shown to contain natural pesticidal chemicals. These chemicals are toxic to disease pathogens and to bollworms and budworms. Genetic studies at College Station, Texas, further showed it is possible to breed for increased levels of these natural chemicals. This indicates that varieties with improved natural pest resistance can be developed, making it possible to reduce the amounts of synthetic chemical pesticides currently needed to produce cotton.

✓ Computer Assisted Information System Plan for National Plant Germplasm Program is Unveiled. First year effort in a 5 year plan for implementing a computer-assisted information system included a feasibility study and identification of information needs. Progress in this early phase has exceeded expectations. The information system is designed to service the National Plant Germplasm System. The needs of users of plant germplasm are being taken into account through recommendations of crop advisory committees. Too, the developing national information system is being closely coordinated with the system being developed for the international network of genetic resources centers.

New Source of Sugarbeet Male-sterile Cytoplasm Developed. After 22 years of breeding work, a male-sterile line has been developed in Beta maritima cytoplasm that performs well when used as a hybrid component in Michigan and Ohio. This alternate source of cytoplasmic male sterility could be extremely valuable if the present source of cytoplasmic male sterility proved to be susceptible to a disease such as happened with the Texas cytoplasm in corn.

Tests Developed to Distinguish Corn Product Adulterants in Honey. An absolute test for the addition of corn syrups to honey has been developed and qualified. The different photosynthetic pathways between the corn plant and nectar-bearing plants result in differing ratios of the 13 and 12 isotopes of carbon in their constituents. The very narrow limits of variability in the syrups facilitate the identification of fraudulent addition of corn products to honey. This will permit effective enforcement of laws protecting the purity of honey and in maintaining consumer confidence in the honey market.



## RESEARCH ON THE USE AND IMPROVEMENT OF SOIL, WATER, AND AIR

Current Activities: Research is conducted to improve the cropland, watershed rangeland and noncultivated areas of the U.S. through development of sound resource management practices. Research deals with many aspects of the environment and covers a wide range of natural resource uses involving complex ecological systems. Much of the research is oriented to developing cultural practices and cropping systems that assure efficient use of soil, water, and air resources while providing adequate protection for sustained use. Investigations include reducing salt damage to soils, crops, and water; improving irrigation and drainage of agricultural land; developing tillage practices for improving soil properties and crop growth, managing and using precipitation and solar energy for crop production; reclaiming and revegetating land areas disturbed by man; utilizing, managing and conserving soil fertility for increased production and nutritional quality of plants and animals; preventing pollution of and improving the quality of soil, water, and air; controlling water erosion, wind erosion and sedimentation; and conserving and managing agricultural water resources.

Soil, water, and air research includes unique programs that serve the needs of specific problem areas relating directly to agriculture but also having wide application for nonagricultural purposes. Some of these programs include the study of remote sensing techniques for crop yield prediction; energy conservation and use; effect of such climatic extremes as drought on crops, animals, and man's water needs; human and animal nutrition as influenced by chemical content of soil, water, and air; management of soils including disposal of waste from urban and agricultural sources; and improvement of water and air quality for rural communities.

### Selected examples of recent progress:

Reducing Irrigation to Reduce Salt Load of the Colorado River Demonstrated. In some areas of the Colorado River Basin, the subsoils contain appreciable salt deposits. When the amount of irrigation water was reduced by 25 percent in the Grand Valley, corn yields were not reduced; but the amount of salt being returned in the drains was reduced. It is estimated that if irrigation water could be reduced by 25 percent throughout the valley, the amount of salt being returned to the river each year in the drainage water could be reduced by 50 percent.

✓ Scheduling Irrigation Reduces Costs and Conserves Water. About 18 percent of the cropland in the U.S. is irrigated, and the acreage is increasing every year. Irrigation scheduling offers a great potential for conserving water and energy. Researchers have developed guidelines that provide scheduling techniques for various crops, soils, and water supplies. For example, during 1977, a farmer cooperating with the researchers produced 11,800 kilograms of corn per hectare (236 bu/acre) with 25 percent less water than was used on those fields not following a schedule. This yield is more than double the average irrigated corn yield in Colorado. Scheduled irrigation makes possible appreciable saving in water and energy, as well as a substantial increase in yield.



Grass Barriers Increase Success of Dryland Cropping. Grass barriers control wind erosion and increase soil water recharge during the interval between crops. This increased water storage has been instrumental in increasing the probabilities of successfully cropping two or more years in a row in lieu of summer-fallowing. As a consequence, cropping systems developed within the grass barrier study such as spring wheat-winter wheat-fallow and safflower-barley-winter wheat-fallow offer options that are replacing conventional spring wheat-fallow on dryland in Montana, North Dakota, and western South Dakota. These improved cropping systems utilize 50 to 80 percent of the precipitation as compared to only 30 percent for spring wheat-fallow. This illustrates why such improved cropping systems with less reliance on fallow help control saline seeps, which have been a severe problem in the Northern Great Plains.

Stable Isotopes for Human Nutrition Research. Both magnesium and iron are important elements that move through the food chain from soils to plants to animals. Measurement of the availability of these elements to humans has not been possible because of the health risks associated with the use of radioisotope tracers. However, recently developed techniques for the safe use of stable isotopes now allow these elements to be incorporated into plant and other food sources for use in controlled research related to human nutrition needs.

✓ Management Practices Developed for Removal of Nutrients from Municipal Wastewater. Soil and crop management systems involving the application of municipal wastewater have been studied for 4 years at St. Paul, Minnesota. Results indicate that with proper crop and water management, the applied effluent can provide most of the nutritional needs of a growing crop. Such management systems produce high yields of dry matter and provide maximum removal of nitrogen from the wastewater. The quality of the drainage water in this study shows that the system provides adequate renovation of the wastewater.

Nitrogen and Phosphorus Compounds in Rainfall Absorbed by Agricultural Watersheds. Sampling of rainfall and streamflow has been conducted on an agricultural watershed in Georgia for over 2 years. Rainfall inputs of nitrogen and phosphorus to the watershed were found to greatly exceed the load of these chemicals in streamflow. Only 5 percent nitrogen and 34 percent phosphorus of the rainfall input loads moved into streamflow during this period. These results emphasize the need to consider total systems when evaluating agriculture's contribution to water quality.

✓ Irrigation Energy Costs Reduced. The increased cost of electricity represents a major impact on the irrigation farmer. In cooperation with rural power districts, researchers in Nebraska have developed a system for cutting off irrigation motors during the time of day when urban energy requirements are highest. By following these schedules in 1977, the irrigation farmers in one power district saved \$413,000 in power costs. Similar systems are being developed for other power districts. Future studies will include the use of low-pressure distribution systems for center pivot sprinklers. This inclusion should further reduce energy and cost requirements. By using electricity in off-peak hours, the farmer is not only saving money, but is also conserving energy for both the rural and urban user.

Pesticide Residue Decomposition Enhanced by Addition of Organic Wastes. The degradation of 14 different pesticides in soil was studied with and without the addition of sewage sludge and dairy manure. Results generally indicated that pesticide residues had no adverse effects on soil microbial respiration. Also, increased rates of pesticide degradation were observed in organic-amended soil. However, degradation of pesticides initially degraded by dealkylation reactions was inhibited by sewage sludge but enhanced by dairy manure. This was due to the heavy-metal content of the sludge. These results indicate that pesticide persistence in soils may be significantly altered by the application of organic amendment.

Conservation Tillage to Increase Crop Production and Environmental Protection. For many years clean-tilled soil was associated with good farming. It controlled weeds, reduced diseases that were transmitted in crop residues, and recycled plant nutrients in the residues. But the farmer now finds that he must produce crops with less labor, and he must devote even more effort to conserving his land. Available pesticides permit him to shift his tillage practices to those that use less labor and to those that use crop residues to protect his soil from erosion. Protecting the soil surface increases the fraction of the rain that is absorbed by the soil. The added soil water aids in increasing his crop yields. Of the benefits from conservation tillage, by far the greatest are the reduced labor need and the increased environmental protection. Researchers are now developing guidelines for better tillage practices to more effectively produce crops and to conserve soil, water, and agricultural chemicals.

Measurement of Nitrous Oxide Quantifies Losses to the Aerial Environment. Information on nitrous oxide losses is much needed in assessing agriculture's contribution of this gas to the aerial environment and its ultimate effect on the ozone layer. Micrometeorological methods were developed and used to measure these losses. Studies were made on fields of alfalfa, sugar beets, and corn. Results show relatively low losses except for small increases over a short time immediately following irrigation of the crops in the fields fertilized with nitrogen. Specific data obtained will be important in developing quantitative estimates of the specific impact projected by this potential problem.

Minimizing Plant Stress. Availability of soil moisture is often the most limiting factor in plant growth. Almost 30 percent of the precipitation that falls in the U.S. eventually returns to the sea. About 70 percent is evaporated. Most of the solar energy a plant receives evaporates water. Only 2 to 5 percent is used in photosynthesis, and photosynthesis drops drastically whenever there is a water deficit. Scientists are working on better guidelines for conserving water. They are also working on better procedures to increase the tolerance of plants to water stress. If water requirements, temperature requirement patterns of crop plants, and the rainfall and temperature patterns in an area are known, researchers can predict the times when water stress to the plants will occur and the consequences and intensity of the stress. Data from remote sensing devices to monitor stress are produced in conjunction with NASA and NOAA.

Economic Feasibility of Solar Energy. The cost of equipment and the amount of energy collected were analyzed for several of the Agricultural Research-managed, Department of Energy-funded research projects on agricultural applications of solar energy. Some systems for heating greenhouses, heating swine farrowing houses, and drying grain were competitive in cost with fuel oil for electricity. Where new construction of such facilities is planned, solar energy should be considered.

PROCESSING, STORAGE, DISTRIBUTION, FOOD SAFETY,  
AND CONSUMER SERVICES RESEARCH

Current activities: Research is conducted to improve the efficiency of processing, storage, and distribution of food and agricultural products. The major emphasis is to maintain or improve agricultural product quality and reduce costs of marketing, processing, storage, and transportation through research and technology that would reduce losses from waste, spoilage and insect infestation, reduce energy requirements and pollution, optimize retention of nutrients and quality and insure product safety.

Research is conducted on problems of human health and safety. Studies develop means to insure that food and feed supplies and products are free from toxic or potentially dangerous residues, harmful chemicals, and microorganisms introduced from agricultural sources, or during processing operations. The research also includes studies of the means to control insect pests of man and his belongings; prevent transmission of animal diseases and parasites to man; reduce the hazards to human life resulting from pesticide residues, toxic molds, tobacco, and other causes; and develop technology for the detection and destruction of illicit growth of narcotic-producing plants.

Research is conducted on consumer services by studying family use of resources, by identifying budgeting problems of families, and by providing information on fabric performance and the use and care of clothing and household articles by consumers.

Selected examples of recent progress:

Method for Determining Protein in Hard Red Winter Wheat Adopted by Federal Grain Inspection Service. The work reported in an article entitled "Inter- and Intra-Laboratory Reproducibility of Protein Determination in Hard Red Winter Wheat by Kjeldahl and Near Infrared Procedures," was the basis for the decision made by the Federal Grain Inspection Service to use near infrared instruments to measure protein in hard red winter wheat for export and for voluntary Federal protein testing effective May 1, 1978.

Study of Food Marketing in Rural Areas Released. A study was completed on developing, planning, organizing, and operating farmers' markets. Eight markets of different sizes and types were studied to provide facts and practical information for planners, organizers, and managers of retail-type farmers' markets. A draft of a report of the study is being prepared for publication.

Improved Refrigerated Van-Containers Designed for Overseas Transport. Design criteria developed by SEA/AR researchers to improve transit environments in refrigerated van-containers for fresh fruits and vegetables shipped to overseas markets have been adopted on a large scale by a leading foreign flag ocean carrier. A fleet of over 400 units valued at more than \$12 million are now supplying weekly service from the U.S. to Europe. They are transporting over \$26 million worth of U.S. perishables annually with losses of less than 2%. These new units greatly enhance the ability of shippers to increase export sales by delivering high quality products overseas with fewer losses.

Increased Effectiveness of Alfalfa Saponins Found in Preventing Cholesterol Absorption. Partially hydrolyzed alfalfa saponins five times as effective as whole, intact alfalfa saponins in preventing cholesterol absorption in primates. This finding makes the isolation and use of the partially hydrolyzed alfalfa saponin economically practical. The saponin is important in treating hypercholesterolemia in monkeys, and potentially in man.



Kernel Sweet Corn Removed Intact Increases Yield. A new method has been devised for removal of kernels from the cob without cutting. A second season of testing confirmed that intact kernel sweet corn is consistently preferred by taste panels over conventionally-cut products. A 15 percent increase in yield is realized for all varieties tested. Two equipment manufacturers have undertaken development of equipment for kernel removal. This procedure has promise for eventual application to field machinery for separation of kernels, thus reducing raw product and trash hauling costs.

New Basis for Controlled Fermentation Procedures for Sliced Large Cucumbers Developed. Lowered levels of salt, heating of the slices and addition of calcium acetate buffer resulted in increased yields, firmer slices and less waste. Increased brine depth and CO<sub>2</sub> removal were found to reduce bloater. Methods for purging CO<sub>2</sub> are under study.

Hidden Insects Detected by New, Rapid Method. An insect detection system developed and patented by SEA/AR is undergoing field testing by the Federal Grain Inspection Service to determine the feasibility of incorporating the CO<sub>2</sub> detection method into their inspection procedures. The system also is being evaluated by the Department of Defense to determine how it may fit into their inspection and surveillance of subsistence items. Technicon Instrument Company, Inc., licensee of the patent, has now produced its first commercial model. This instrumentation provides government agencies and U.S. agribusiness a rapid and effective method for detecting insect infestation in raw or processed foods and feeds. The system is nondestructive so samples are available for further analysis and subsequent warranty or legal actions.

✓ Guayule Yield Increased with Chemical Treatments. SEA/AR scientists have chemically treated guayule, a desert shrub native to Texas and Mexico, causing the plant to produce over 3 times the rubber it normally yields. Such increase might lead to a commercially feasible, domestic natural rubber source to replace the 719,000 tons imported yearly at a cost of over \$500 million.

Nonfat Dry Milk Utilized for Cheese-Making, Including Cheese for School Lunch Programs. A process has been developed to utilize CCC stocks of nonfat dry milk to manufacture cheese. Procedures and specifications have been developed for ASCS for the manufacture of mozzarella cheese. The process is now being used by several commercial cheese manufacturers to supply the cheese for school lunch programs in several States. The successful process development will be of benefit in reducing USDA's stocks of surplus nonfat dry milk.

Inhibiting of Bacon Curing Agents Studied. A phenolic compound, a-tocopherol, solubilized with polysorbate 20 in ratios of 1:1, 1:0.4 and 1:0.2 in a model system for bacon was found to significantly inhibit the nitrosation of pyrrolidine. In bacon prepared with 125 ppm NaNO<sub>2</sub>, a-tocopherol and sodium ascorbate inhibited nitrosopyrrolidine (NPYR) in fried bacon and its drippings.

The Effect of Processing on the Fate of Natural Toxicants and Microbial Toxins in Fruit and Vegetables. Glycoalkaloids in potatoes are significantly reduced by boiling, microwave cooking or deep-fat frying. The fate of the total glycoalkaloids is still unknown. Recent reports indicated the presence of patulin, a mycotoxin isolated from several species of aspergillus and penicillium in apple cider. Studies in USDA laboratories have shown that the commercial fermentation procedures used for making apple wine will destroy patulin if it is present in the juice prior to fermentation.

Safety of Ammoniated Aflatoxin-Contaminated Corn Evaluated. Feeding studies on ammoniated corn are still in progress but the results so far indicate no adverse effects in rats on growth, reproduction, mutagenicity, teratogenicity or carcinogenicity. These studies are being done in accordance with FDA protocol for approval of ammoniated corn for use as feed for poultry and swine.

Mutagenicity Studies Clear Two Fungicides Used on Citrus for Export. Two fungicides, orthophynylphenol and thiabendazole, were tested for possible mutagenicity by the Ames test and found to be negative, thus clearing the way for their use on citrus being exported to Japan.

Composition of Breeders Stocks and Commercial Production of Soybeans Analyzed. Over 6,000 soybean samples were received from southern and northern United States and Canada during the last quarter of the year. These soybeans were examined for oil and protein, and the results reported. In addition, more than 1,500 samples from the 1977 harvest were analyzed for the Federal Grain Inspection Service. The analysis of the 1977 harvest was part of a six-agency cooperative project.

Snack Products from Beans Exhibit Significantly Increased Protein Content. Highly acceptable snack products were prepared from blackeye, garbanzo and small white bean flours in combination with cereal grains. The blackeye bean combination exhibited a PER of 2.2 compared with 2.5 for casein.

New Starch Derivative Possibilities Suggested Using Immobilized Enzymes on Different Media. It is generally recognized that immobilization of some enzymes alters their kinetic, operating, and stability parameters. Little attention has been paid to the effect of the carrier on these parameters and its mechanism. It now has been shown that  $\alpha$ -amylase immobilized on porous glass has properties different from the same enzyme immobilized on phenol-formaldehyde resin. This opens the possibility of using enzymes immobilized on different media to prepare polymeric starch derivatives that would be difficult or impossible to prepare in any other manner.

Batch Processing of Dried Instant Rice Adapted to Continuous Process. Conditions established for making quick-cooking rice products on a small-scale batch centrifugal fluidized bed (CFB) drier were adapted to a continuous CFB unit. Minor equipment changes provided successful production capacity of 20-60 lbs/hr of dried instant-type rice in continuous test runs up to 5 hours. Cooking quality and storage stability were comparable to commercial products. Several U.S. food companies and two foreign firms have expressed interest in commercial developments. Taste panels showed no preference between commercial rice and CFB-dried instant short, medium, and long grain rice.

Histamine Content Examined in Byssinosis Studies. Studies have been underway to isolate and identify the causative agent in producing byssinosis. Aqueous extraction leaves about 20 percent of the endogenous histamine in the dust and 15-25 percent of the capacity to induce histamine release. Histamine content is unaffected by freeze-drying but 90 percent is removed by charcoal.

## HUMAN NUTRITION

Current Activities: Research is conducted on human nutritional requirements, composition and nutritive value of foods and food consumption surveys to provide dietary guidance and information needed by consumers and by Federal, State and local agencies administering food and nutrition programs.

Selected examples of recent progress:

1977-78 Nationwide Food Consumption and Supplemental Surveys Carried Out. Technical support and supervision were provided for nationwide surveys of household food consumption and food intakes of individuals, for supplemental surveys in Alaska, Hawaii, and Puerto Rico, and for surveys of elderly and low-income populations in the other 48 States. Pilot tests were completed, basic survey documents prepared, and 5-day regional training sessions held for interviewers. Information was developed on several thousand additional food items to reflect expanding variety in the U.S. diet and the new or modified foods now available.

Modest Amounts of Some Sources of Dietary Fiber Improve Glucose Tolerance and Lower Serum Cholesterol in Human Subjects. Corn bran, soybean hulls, apple powder, and carrot powder improve glucose metabolism. Hard red spring wheat bran and soybean hulls lowered cholesterol significantly when added to a conventional diet.

Revision of Home and Garden Bulletin No. 72. The revision of Home and Garden Bulletin No. 72, "Nutritive Value of Foods," was published. This bulletin is for the consumer and presents nutritive values of foods in terms of household measures. This major revision was made possible by the information being acquired in revisions of the more comprehensive publication, Agriculture Handbook No. 8, "Composition of Foods...Raw, Processed, Prepared."

Intrauterine Zinc Deficiency Causes Increased Aggression in Offspring. New-born rats were rehabilitated with extra zinc, following intrauterine zinc deprivation during fetal development. Some weeks later they were found to be more aggressive than rats from normal pregnancy. Whether similar effects occur among pregnant women with low-zinc diets is still unknown.

Multiple Nutritional Deficiencies Increase Lead Toxicity. Lead poisoning is much more severe in rats deficient in both calcium and vitamin E than in rats deficient in either nutrient alone. This finding indicates the need to assess the effects of exposure to heavy metal environmental pollutants in individuals with several simultaneous marginal deficiencies.

Practices Used in Home Canning of Fruits and Vegetables. The need for both beginning and experienced home canners to use safe, reliable home-canning instructions was noted in a recent nationwide study. Information from 900 home canners in a national sample of private households indicated that one out of three U.S. households canned fruit and/or vegetables. Tomatoes were canned by 75 percent of the canning households; other vegetables, pickles, and fruits were canned by 50 percent; and about 40 percent preserved jams and jellies. USDA and State Extension Service publications were each used by about 10 percent of the canners.



Brewers Yeast Standard Reference Material Certified for Chromium. A Standard Reference Material (SRM 1569) - Brewers Yeast) has been certified for chromium content and issued by the National Bureau of Standards in cooperation with the Nutrition Institute. This material is intended for use in calibrating instrumentation and evaluating the accuracy of analytical methods for the determination of chromium in biological materials. An international collaborative study of chromium analysis involving 12 laboratories has been carried out using this material, and several previously unrecognized procedural and methodological problems have been better diagnosed. This Standard Reference Material will have a great impact upon accuracy for determination of the content of the essential trace element chromium in foods and other biological materials.

Agriculture Handbook 8-2 "Spices and Herbs" Released. "Spices and Herbs," the second section of the revised Agriculture Handbook No. 8, was published. The USDA computerized Nutrient Data Bank is operational for use in the development of the revisions of Handbook No. 8.

CONTINGENCY RESEARCH FUND

The Contingency Research Fund, established by Congress in fiscal year 1962, is designed to provide a ready source of funds to meet unforeseen and immediate research needs. Releases from the fund are generally made in situations where an emergency exists, or for special needs such as an unexpected scientific "break-through," or for new diseases or pest problems where it appears inadvisable to wait for consideration of a request for funds for the project in the regular budget process. In allocating funds, the procedure ordinarily is to make no commitments for allocations from the fund beyond the current year.

Animal Production Efficiency Research: 1978 Obligations

Development of new blood-sucking arthropod control and livestock disease treatment methods by using the red blood cells of livestock as capsules for the packaging or encapsulation of insecticides and drugs ....	\$30,000
To train State diagnostic laboratory personnel in recognizing contagious equine metritis and methods of culturing and identifying the causative agent of the disease .....	28,000
For cooperative research at the University of Kentucky to develop new diagnostic methods to replace the existing tests for detecting contagious equine metritis..	20,000
For fumigation of timothy hay before exportation .....	800
For production and storage of 1 million doses of foot-and-mouth disease vaccine antigen .....	75,000
Training programs on diagnosis of African swine fever; distribution of training materials; and diagnostic aids including conjugates .....	21,500

Crop Production Efficiency Research:

Cucumovirus associated with RNA, tomato necrosis .....	70,000
Testing U.S. sugarcane clones for smut reaction .....	10,000
Large-volume tissue culture systems for the production of insect viruses .....	60,000
Toxicity of beef tissue from steers fed corn ammoniated to inactivate aflatoxins .....	52,000
Coordinated effort to delineate overwintering habitats of the fall armyworm in Florida and Georgia .....	60,000
Management practices to protect cotton from pink bollworm and other insect pests .....	47,000
Sweet potato insect control .....	25,000
Testing U.S. sugarcane clones in Florida for smut reaction	32,000
Research on "Africanized" bee in South America .....	31,400

Research on Conservation and Use of Land and Water  
Resources and Maintaining Environmental Quality:

Acid rain and its effects on agricultural productivity .... 50,000

Processing, Storage and Distribution Efficiency Research:

Emergency explanatory epiphytological and epidemiological  
studies of diseases related to mechanical harvesting  
in grapes and blueberries ..... 18,000

Influence of closed boll harvesting on reaction of  
human subjects to cotton dust ..... 25,000

Systematic study of explosion, control and handling  
and utilization of grain dust ..... 45,000

Travel cost for conducting in-transit shipboard fumigation  
test on a tanker-type vessel carrying U.S. grain to  
U.S.S.R. .... 9,500

For fumigation of timothy hay before exportation ..... 800

Assessment of new technologies in cotton processing ..... 20,000

Research to Improve Human Health and Safety:

Survey for aflatoxin contamination in corn in the  
midwest ..... 5,000

Design, construct, and test new processing methods and  
equipment for commercial animal and food wastes, and  
treating food wastes by fermentation process to destroy  
harmful organisms ..... 57,000

Differentiating pathogenic and non-pathogenic Yersinia  
enterocolitica ..... 22,000

Pilot test in El Salvador for control of Anopheles  
albimanus and Malaria by integrated techniques ..... 97,000

Use of thamidium elegans for inhibiting pathogenic and  
spoilage bacteria on meat and improving palatability .... 28,000

Integrated mosquito control in Maryland wetlands ..... 10,000

Development of polymeric delayed-action toxicants for  
use in baits to control imported fire ant ..... 50,000

Total, 1978 Obligations, Contingency Research Fund ..... 1,000,000



STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
ALABAMA, Auburn.....	\$1,843,991	65	\$1,728,500	62	\$ 1,728,500	62
ALASKA, Palmer.....	495,762	9	510,000	9	365,400	6
ARIZONA						
Flagstaff.....	54,548	2	- -	- -	- -	- -
Phoenix.....	3,145,603	117	3,154,600	115	3,040,200	111
Tucson.....	2,699,196	88	2,765,100	88	2,636,100	88
Total.....	5,899,347	207	5,919,700	203	5,676,300	199
ARKANSAS, Stuttgart...	117,172	2	112,800	2	112,300	2
CALIFORNIA						
Albany.....	14,407,308	422	15,793,600	422	13,167,800	344
Brawley.....	751,679	28	771,800	28	632,700	24
Davis.....	732,761	16	1,015,700	16	768,300	13
Fresno.....	1,897,752	61	2,116,100	61	2,116,100	61
Indio.....	393,347	11	331,300	11	288,300	11
Pasadena.....	831,752	19	659,900	19	659,900	19
Riverside.....	1,860,868	60	1,849,600	60	1,849,600	60
Salinas.....	951,558	33	997,300	31	937,100	31
Shafter.....	689,736	20	667,300	20	568,200	17
Total.....	22,516,761	670	24,202,600	668	21,006,000	580
COLORADO						
Akron.....	365,299	9	383,000	9	383,000	9
Denver.....	1,254,057	41	1,301,700	41	1,301,700	41
Fort Collins.....	3,160,384	98	3,164,100	98	3,108,200	98
Total.....	4,779,740	148	4,848,800	148	4,792,900	148
DISTRICT OF COLUMBIA						
Program.....	1,820,350	83	1,933,400	83	1,761,400	83
Headquarters						
Agency Management						
Services.....	23,674,739	580	24,622,300	624	20,922,500	624
Centrally Financed						
Program.....	2,189,054	13	10,781,700	6	10,781,700	6
Subtotal.....	25,863,793	593	35,404,000	630	31,704,200	630
Total.....	27,684,143	676	37,337,400	713	33,465,600	713
DELAWARE						
Georgetown.....	275,660	7	273,200		273,200	7
Newark.....	357,891	14	379,500	14	379,500	14
Total.....	633,551	21	652,700	21	652,700	21
FLORIDA						
Belle Glade.....	187,744	6	165,800	6	165,800	6
Bradenton.....	45,132	1	58,800	1	42,800	1
Brooksville.....	264,769	3	208,800	3	208,800	3
Canal Point.....	442,952	17	680,800	17	425,400	17

STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
FLORIDA (continued)						
Fort Lauderdale.....	113,058	3	110,300	3	110,300	3
Gainesville.....	4,832,294	138	5,123,500	138	4,974,600	138
Lake Alfred.....	117,052	4	113,200	4	113,200	4
Miami.....	753,585	31	673,400	31	673,400	31
Orlando.....	2,099,441	75	2,174,400	75	2,097,900	72
Winter Haven.....	654,172	22	654,000	22	518,400	14
Total.....	9,510,199	300	9,936,000	300	9,330,600	289
GEORGIA						
Athens.....	6,700,704	240	6,784,800	240	6,457,400	227
Byron.....	1,445,581	61	1,455,800	59	1,382,900	56
Dawson.....	555,550	23	569,800	23	569,800	23
Experiment.....	245,686	6	277,000	6	277,000	6
Savannah.....	1,963,195	71	1,940,300	71	1,940,300	71
Tifton.....	3,430,674	103	3,544,300	103	3,315,400	97
Watkinsville.....	1,112,145	38	1,132,000	38	1,132,000	38
Total.....	15,453,535	542	15,704,000	540	15,074,800	518
HAWAII						
Hilo.....	545,493	9	411,300	9	411,300	9
Honolulu.....	993,652	31	1,162,700	31	1,162,700	31
Total.....	1,539,145	40	1,574,000	40	1,574,000	40
IDAHO						
Aberdeen.....	309,590	7	306,100	7	306,100	7
Boise.....	570,879	17	547,800	17	547,800	17
Dubois.....	1,286,957	19	766,400	19	766,400	19
Kimberly (Twin Falls)	1,353,279	50	1,476,200	49	1,476,200	49
Total.....	3,520,705	93	3,096,500	92	3,096,500	92
ILLINOIS						
Chicago.....	118,286	3	144,100	3	144,100	3
Peoria.....	15,018,808	470	14,928,300	470	12,633,500	462
Urbana.....	1,871,586	45	2,015,900	45	1,831,900	42
Total.....	17,008,680	518	17,088,300	518	14,609,500	507
INDIANA						
Lafayette.....	1,653,258	34	1,811,000	34	1,690,700	31
Vincennes.....	266,572	8	254,900	8	226,500	8
Total.....	1,919,830	42	2,065,900	42	1,917,200	39
IOWA						
Ames.....	10,315,582	317	10,791,500	317	10,093,000	311
Ankeny.....	397,205	9	353,300	9	353,300	9
Total.....	10,712,787	326	11,144,800	326	10,446,300	320
KANSAS, Manhattan.....	2,715,440	71	2,736,300	71	2,685,600	71
KENTUCKY, Lexington...	807,583	27	789,200	27	342,900	8

STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
<b>LOUISIANA</b>						
Baton Rouge.....	1,075,265	41	1,148,400	41	1,012,800	35
Crowley.....	117,356	4	116,000	4	116,000	4
Houma.....	857,281	28	1,187,300	28	800,300	28
Jeanerette.....	64,106	2	32,700	1	32,700	1
Lake Charles.....	569,747	7	244,600	7	244,600	7
New Orleans.....	15,615,228	465	15,196,100	465	14,166,200	461
Total.....	18,298,983	547	17,925,100	546	16,372,600	536
<b>MAINE, Orono.....</b>						
	612,629	15	415,200	14	- -	--
<b>MARYLAND</b>						
Beltsville.....	51,807,864	1,701	51,442,900	1,686	49,009,400	1,627
Frederick.....	1,431,624	41	1,611,400	41	1,534,000	41
Glenn Dale.....	326,206	12	285,500	11	285,500	11
Hyattsville.....	4,664,878	88	7,438,300	88	7,438,300	88
Total.....	58,230,572	1,842	60,778,100	1,826	58,267,200	1,767
<b>MASSACHUSETTS</b>						
Boston.....	60,000	--	301,000	--	2,301,000	8
Otis AFB.....	--	--	104,700	2	104,700	2
Total.....	60,000	--	405,700	2	2,405,700	10
<b>MICHIGAN, East Lansing</b>						
	2,298,214	69	2,329,000	69	2,329,000	69
<b>MINNESOTA</b>						
East Grand Forks....	337,869	10	299,600	10	299,600	10
Minneapolis.....	131,083	3	146,500	3	146,500	3
Morris.....	946,934	36	1,049,700	36	920,900	30
St. Paul.....	1,387,963	40	1,645,800	40	1,645,800	40
Total.....	2,803,849	89	3,141,600	89	3,012,800	83
<b>MISSISSIPPI</b>						
Gulfport.....	211,099	8	251,600	8	215,600	8
Meridian.....	334,083	12	324,500	12	324,500	12
Oxford.....	1,570,258	56	1,611,900	56	1,611,900	56
Poplarville.....	153,951	3	200,500	3	200,500	3
Mississippi State...	3,682,798	95	3,429,700	93	3,429,700	93
Stoneville.....	4,778,192	185	5,013,800	185	4,632,700	173
Total.....	10,730,381	359	10,832,000	357	10,450,900	345
<b>MISSOURI, Columbia....</b>						
	2,955,815	88	3,214,500	88	2,968,400	77
<b>MONTANA</b>						
Bozeman.....	536,043	16	573,900	16	573,900	16
Miles City.....	1,002,450	11	912,100	11	834,700	11
Sidney.....	764,772	26	755,400	26	755,400	26
Total.....	2,303,265	53	2,241,400	53	2,164,000	53



STATEMENT OF OBLIGATIONS AND MAN-YEARS  
BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
NEBRASKA						
Clay Center.....	5,186,916	57	5,127,900	57	5,127,900	57
Lincoln.....	1,283,635	32	1,635,500	32	1,635,500	32
Total.....	6,470,551	89	6,763,300	89	6,763,300	89
NEVADA, Reno.....	581,078	13	559,700	13	559,700	13
NEW JERSEY, New Brunswick.....	373,123	10	376,200	10	376,200	10
NEW MEXICO, Las Cruces	944,605	31	921,000	31	840,800 162,000	28
NEW YORK						
Geneva.....	140,200	5	162,000	5	162,000	5
Ithaca.....	2,129,476	43	2,052,800	43	1,881,700	40
Plum Island.....	9,284,818	348	9,329,000	342	9,329,000	342
Total.....	11,554,494	396	11,543,800	390	11,372,700	387
NORTH CAROLINA						
Oxford.....	1,028,761	37	980,000	37	910,000	34
Raleigh.....	2,649,942	58	3,040,200	58	2,926,300	53
Total.....	3,678,703	95	4,020,200	95	3,836,500	87
NORTH DAKOTA						
Fargo.....	4,462,664	121	4,450,200	121	4,278,200	121
Grand Forks.....	1,733,570	30	2,028,300	30	2,028,300	30
Mandan.....	1,966,397	65	1,555,900	61	1,298,000	53
Total.....	8,162,631	216	8,034,400	212	7,604,500	204
OHIO						
Columbus.....	133,819	5	171,800	5	171,800	5
Coshocton.....	752,456	17	505,500	16	505,500	16
Delaware.....	477,337	15	518,300	15	432,300	15
Wooster.....	1,054,444	37	1,136,500	37	863,700	31
Total.....	2,418,056	74	2,332,100	73	1,973,300	67
OKLAHOMA						
Chickasha.....	695,112	30	809,700	30	809,700	30
Durant.....	535,542	21	609,100	20	609,100	20
El Reno.....	612,421	8	721,700	8	614,200	8
Stillwater.....	880,890	21	1,097,900	21	951,700	21
Woodward.....	347,303	16	437,300	16	351,300	16
Total.....	3,071,268	96	3,675,700	95	3,336,000	95

STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
OREGON						
Burns.....	74,118	1	209,900	1	80,900	1
Corvallis.....	1,412,414	43	2,105,900	43	1,611,800	39
Pendleton.....	639,647	19	593,800	19	593,800	19
Total.....	2,126,179	63	2,909,600	63	2,286,500	59
PENNSLYVANIA						
University Park.....	1,814,624	50	2,001,300	50	1,904,600	50
Wyndmoor.....	9,635,091	313	9,710,600	313	7,109,600	264
Total.....	11,449,715	363	11,711,900	363	9,014,200	314
SOUTH CAROLINA						
Charleston.....	919,767	38	1,076,000	38	1,076,000	38
Clemson.....	1,168,326	40	1,145,600	40	873,400	40
Florence.....	990,571	36	1,095,800	36	1,095,800	36
Total.....	3,078,664	114	3,317,400	114	3,045,200	114
SOUTH DAKOTA,						
Brookings-Madison...	1,052,387	38	1,218,800	37	1,046,800	37
TENNESSEE						
Greenville.....	122,265	4	143,700	4	- -	--
Jackson.....	147,406	4	105,100	3	105,100	3
Knoxville.....	865,194	30	896,200	30	687,600	22
Lewisburg.....	101,948	4	105,300	4	105,300	4
Total.....	1,236,813	42	1,250,300	41	898,000	29
TEXAS						
Beaumont.....	417,807	15	407,300	15	407,300	15
Big Spring.....	181,134	5	166,800	5	166,800	5
Brownsville.....	1,207,242	45	1,085,700	44	1,085,700	44
Brownwood.....	471,895	12	360,300	12	360,300	12
Bushland.....	1,187,825	36	1,288,700	36	1,288,700	36
College Station.....	4,952,815	171	4,902,300	158	4,824,900	158
El Paso.....	47,919	1	39,300	1	- -	--
Houston.....	--	--	1,290,000	--	1,290,000	7
Kerrville.....	1,604,501	64	1,714,600	63	1,714,600	63
Lubbock.....	727,948	24	750,100	22	750,100	22
Mission.....	756,372	20	685,000	19	685,000	19
Temple.....	1,593,551	45	1,572,700	45	1,572,700	45
Vernon (Chillicothe)	65,973	3	64,800	3	64,800	3
Weslaco.....	2,997,215	111	3,071,300	111	2,808,700	101
Total.....	16,212,197	552	17,398,900	534	17,019,600	530
UTAH, Logan.....	1,911,791	57	1,916,800	57	1,830,800	57

STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
VIRGINIA						
Blacksburg.....	96,309	3	74,900	3	74,900	3
Richmond.....	170,213	5	152,800	5	- -	- -
Suffolk (Holland)...	353,404	12	367,200	12	367,200	12
Total.....	619,926	20	594,900	20	442,100	15
WASHINGTON						
Prosser.....	1,194,545	37	1,222,900	37	1,107,000	37
Pullman.....	2,114,672	70	2,132,700	68	2,076,800	68
Wenatchee.....	883,207	23	859,100	23	811,400	23
Yakima.....	1,607,799	50	1,255,500	42	1,162,300	40
Total.....	5,800,223	180	5,470,200	170	5,157,500	168
WEST VIRGINIA						
Kearneysville.....	234,484	2	1,217,400	2	271,400	2
Morgantown.....	458,522	15	516,200	15	516,200	15
Total.....	693,006	17	1,733,600	17	787,600	17
WISCONSIN, Madison....	1,626,922	42	2,282,700	42	1,590,400	42
WYOMING						
Cheyenne.....	449,170	15	636,600	15	460,300	15
Laramie.....	308,392	11	277,800	10	277,800	10
Total.....	757,562	26	914,400	25	738,100	25
PUERTO RICO						
Mayaguez.....	700,831	36	750,000	36	750,000	36
Rio Piedras.....	311,661	9	320,600	8	320,600	8
Total.....	1,012,492	45	1,070,600	44	1,070,600	44
VIRGIN ISLANDS,						
ST. Croix.....	120,810	4	211,100	4	211,100	4
OTHER COUNTRIES						
Argentina.....	75,126	1	54,800	1	54,800	1
El Salvador.....	288,237	2	79,100	2	79,100	2
France, Paris.....	357,115	11	306,400	10	306,400	10
Italy, Rome.....	208,582	7	182,100	7	182,100	7
Japan.....	83,716	2	105,500	2	105,500	2
Kenya.....	126,182	2	106,300	2	106,300	2
Netherlands,						
Rotterdam.....	248,545	5	259,900	5	259,900	5
Pakistan.....	60,538	2	--	--	--	--
Thailand.....	35,920	1	62,400	1	62,400	1
Total.....	1,483,961	33	1,156,500	30	1,156,500	30



STATEMENT OF OBLIGATIONS AND MAN-YEARS

BY LOCATION

Location	Actual 1978		Estimated 1979		Estimated 1980	
	Dollars	Man-Years	Dollars	Man-Years	Dollars	Man-Years
Program locations to be determined.....	- -	- -	6,581,800	- -	27,473,800	- -
Contingency Research Fund.....	- - <u>1/</u>	- -	1,000,000	- -	1,000,000	- -
Construction of Facilities.....	3,091,000	- -	- -	- -	- -	- -
Repair and Maintenance of Facilities and Equipment.....	- - <u>2/</u>	- -	8,216,000	- -	8,216,000	- -
Unobligated Balance....	9,473,017	- -	- -	- -	- -	- -
Subtotal, Available or Estimate.....	324,453,253	9,435	347,908,000	9,395	344,496,000	9,020
Allotment to:						
Forest Service.....	353,320	4	380,000	4	376,000	4
Extension Service....	325,000	- -	- -	- -	- -	- -
Total, Available or Estimated.....	325,131,573 <sup>3/</sup>	9,439	348,292,000 <sup>4/</sup>	9,399	344,872,000 <sup>4/</sup>	9,024

1/ Obligations for the \$1,000,000 appropriated in 1978 are included in the projects above.

2/ Obligations for the \$8,216,000 appropriated in 1978 are included in the projects above.

3/ Excludes \$15,000,000 appropriated in 1978 for Competitive Research Grants.

4/ Excludes \$174,000 in 1979 and \$178,000 in 1980 for the National Poultry Improvement Plan activity transferred to APHIS. Also excludes reappropriation of \$2,000,000 of prior year funds for additional labor, subprofessional and junior scientific help in the field.

## COOPERATIVE RESEARCH

### Purpose Statement

Cooperative Research (formerly Cooperative State Research Service) participates in a nationwide system of research program planning and coordination between the States and the U. S. Department of Agriculture which encourages and assists in the establishment and maintenance of cooperation within and between the States and between the States and their Federal research partners. The primary function is the administration of Acts of Congress that authorize Federal appropriations for agricultural research carried on by the State agricultural experiment stations of the 50 States, Puerto Rico, Guam, the Virgin Islands, and the District of Columbia; by approved schools of forestry; the 1890 land-grant institutions and Tuskegee Institute; and other eligible institutions.

Administration of payments and grants involves the approval in advance of each individual research proposal submitted by a State agricultural experiment station or other institution to be financed in whole or in part from Federal grant funds and the disbursement of the funds. The research programs and expenditures are continuously reviewed and evaluated.

The program coordination and planning is carried out by a Cooperative Research staff located entirely in Washington, D. C. As of September 30, 1978, there were 92 full-time permanent employees and 14 other than permanent employees. In addition, the Competitive Grants office had 15 full-time permanent employees and 3 other than permanent employees.





Cooperative Research

Appropriation Act, 1979 .....	\$174,395,000
Budget Estimate, 1980 .....	<u>178,317,000</u>
Increase in Appropriation .....	<u>+3,922,000</u>

SUMMARY OF INCREASES AND DECREASES  
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1979</u> <u>Estimated</u>	<u>Program Changes</u>	<u>1980</u> <u>Estimated</u>
Payments under the Hatch Act ..	\$109,066,000	- -	\$109,066,000
Cooperative forestry research .	9,500,000	- -	9,500,000
Payments to 1890 colleges and Tuskegee Institute .....	16,360,000	- -	16,360,000
Special research grants .....	16,273,000	-\$4,663,000	11,610,000
Competitive research grants ...	15,000,000	+15,000,000	30,000,000
Rural development research .....	1,500,000	-1,500,000	- -
Animal health and disease research .....	5,000,000	-5,000,000	- -
Federal administration (direct appropriation) .....	<u>1,696,000</u>	<u>+85,000</u> a/	<u>1,781,000</u>
 TOTAL AVAILABLE .....	 <u>174,395,000</u>	 <u>+3,922,000</u>	 <u>178,317,000</u>

a/ Includes a total reduction of \$46,000 in travel costs as a part of the Department-wide management initiative to reduce travel costs. Includes a total increase of \$131,000 for pay increases effective in FY 1979 which were absorbed in FY 1979 but which are needed to carry out the programs proposed for FY 1980.

PROJECT STATEMENT  
(On basis of adjusted appropriation)

	1978	1979 (estimated)	Increase or Decrease	1980 (estimated)
1. <u>Payments under the Hatch Act:</u>				
a. Research program .....	\$105,501,133	\$105,561,911	- -	\$105,561,911
b. Penalty mail .....	374,000	476,000	- -	476,000
c. Set-aside for Federal administration (3%) .....	2,841,466	3,028,089	- -	3,028,089
Total, Hatch Act .....	108,716,599	109,066,000	- -	109,066,000
2. <u>Cooperative forestry research:</u>				
a. Research program .....	9,500,000	9,500,000	-\$285,000	9,215,000
b. Set-aside for Federal administration (3%) .....	- -	- -	+285,000	285,000
Total, Cooperative forestry research .....	9,500,000	9,500,000	- -	9,500,000
3. <u>Payments to 1890 colleges and Tuskegee Institute:</u>				
a. Research program .....	14,153,000	15,869,200	- -	15,869,200
b. Set-aside for Federal administration (3%) .....	- -	490,800	- -	490,800
Total, 1890 colleges and Tuskegee .	14,153,000	16,360,000	- -	16,360,000
4. <u>Special research grants:</u>				
a. Research program .....	7,235,000	15,784,810	-4,523,110	11,261,700
b. Set-aside for Federal administration (3%) .....	- -	488,190	-139,890	348,300
Total, Special research grants ....	7,235,000	16,273,000	-4,663,000(1)	11,610,000
5. <u>Competitive research grants:</u>				
a. Research program .....	14,400,000	14,550,000	+14,550,000	29,100,000
b. Set-aside for Federal administration (3%) .....	600,000	450,000	+450,000	900,000
Total, Competitive research grants. <u>a/</u>	15,000,000	15,000,000	+15,000,000(2)	30,000,000
6. <u>Rural development research:</u>				
a. Research program .....	1,440,000	1,440,000	-1,440,000	- -
b. Set-aside for Federal administration (4%) .....	60,000	60,000	-60,000	- -
Total, Rural development research .....	1,500,000	1,500,000	-1,500,000(3)	- -
7. <u>Animal health and disease research:</u>				
a. Research program .....	- -	4,800,000	-4,800,000	- -
b. Set-aside for Federal administration (4%) .....	- -	200,000	-200,000	- -
Total, Animal health and disease research .....	- -	5,000,000	-5,000,000(4)	- -
8. <u>Federal administration (direct appropriation)</u> .....	1,693,836	1,696,000	+85,000(5)	1,781,000
Unobligated balance .....	349,401	- -	- -	- -
Total available or estimate .....	158,147,836	174,395,000	+3,922,000	178,317,000
Transfer from Agricultural Research Service .....	-15,000,000			
Transfer to Office of Secretary .....	+2,164			
Total available .....	143,150,000			

a/ Funds appropriated to the Agricultural Research Service for Competitive Research Grants. This activity was appropriated to Cooperative Research in FY 1979.

b/ Includes \$500,000 for alcohol fuels research grants in accordance with section 1419 of Public Law 95-113.

EXPLANATION OF PROGRAM

The Agriculture, Rural Development, and Related Agencies Appropriations Act of 1979, funds Cooperative Research activities authorized under the following acts:

1. Payments to agricultural experiment stations under the Hatch Act, and for penalty mail - (Agricultural Experiment Stations Act of August 11, 1955, Hatch Act of 1887 as amended - 7 U.S.C. 361a-361i; Education Amendments of 1972, Public Law 92-319, June 23, 1972; Public Law 93-471, October 26, 1974; and Public Law 95-113, September 29, 1977, as amended.)

a. Research Program: The Hatch program of research at the State agricultural experiment stations is aimed at improving rural living conditions and promoting efficient production, marketing, distribution, and utilization of crops and animals that are essential to the food supply or health and welfare of the people of the United States. The following research program groupings encompass the range of research funded under this act:

Natural Resources - 11% of total Hatch funds for research. Included are soil and land use, water and watersheds, outdoor recreation, environmental quality, fish and wildlife, and remote sensing. Increased program emphasis on non-point pollution and water quality is proposed in 1980.

Forestry Resources - 2% of total Hatch funds for research. Forestry related research under Hatch is closely coordinated with the McIntire-Stennis Cooperative Forestry Research program which has similar research objectives. The Hatch forestry research program is characterized by a higher degree of multi-institutional or regional projects. Increased program emphasis on non-point pollution and water quality is proposed in 1980.

Crops Resources - 39% of total Hatch funds for research. Included under this research program grouping are crop protection and production systems for dependable and efficient production, quality improvement, quality maintenance, product development, and related commodity aspects of marketing of crops. Increased program emphasis on integrated pest management is proposed in 1980.

Animal Resources - 28% of total Hatch funds for research. Included under this research program grouping are protection, production and management aspects of beef and dairy cattle, swine, sheep, other animals and poultry. It also includes quality improvement, product development, and related commodity aspects of marketing.

People, Communities and Institutions - 12% of total Hatch funds for research. Included under this research program grouping are food and nutrition, food safety and rural development.

Competition, Trade Adjustments and Price, and Income Policy - 8% of total Hatch funds for research. Included under this research program grouping are farm adjustments, prices and income, economic aspects of marketing and competition.

b. Penalty Mail: The Hatch Act of 1887, as amended (7 U.S.C. 361f), provides for the mailing under penalty indicia by agricultural experiment stations of bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination of results of research, including lists of such publications.



Mailings include not only those to individual farmers upon request but also to newspapers, libraries, other experiment stations, and organizations interested in results of research and dissemination of such results. Under Title 39 U.S.C. 3206(b) and 3202(a)(4), the Department pays the U. S. Postal Service to cover postage of mail sent under the penalty privilege by the State agricultural experiment stations.

- c. Set-aside for Federal Administration: Three percent of funds appropriated under the Hatch Act is set aside for Federal administration. Administration includes disbursement of funds and a continuous review and evaluation of the research programs of the State agricultural experiment stations supported wholly or in part from Hatch funds. Cooperative Research encourages and assists in the establishment of cooperation within and between the States, and also actively participates in the planning and coordination of research programs between the States and the Department at the regional and national level.
2. Cooperative Forestry Research - (Cooperative Forestry Research Act of October 10, 1962, 16 U.S.C. 582a--582a-7; Education Amendments of 1972, Public Law 92-318, June 23, 1972).
- a. Research Program: Research funded under this act is described within the following areas: inventory and appraisal of forest resources; forest production systems and management; forest protection; harvesting, manufacturing, and wildlife; fisheries habitat development; forest recreation and landscape values; and alternative uses of forest land. Timber production and wood utilization and distribution systems are key elements of forestry research. The research is planned and directed to provide answers to the complex questions that face forest land managers who are seeking to produce an adequate timber supply for home and other construction. The research also meets the demands for wildlife production and recreational opportunity on forests, and to assure an acceptable level of environmental quality in relation to all forest operations and uses. Increased program emphasis on non-point pollution and water quality is proposed in 1980.
- b. Set-aside for Federal Administration: Three percent of funds appropriated under this act is set-aside for Federal administration in 1980.
3. Payments to 1890 Colleges and Tuskegee Institute - (The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1445, Public Law 95-113, September 29, 1977; Public Law 95-547, October 28, 1978).
- a. Research Program: Research conducted under this act supports continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890, including Tuskegee Institute. Beginning with the fiscal year ending September 30, 1979, there shall be appropriated for each fiscal year an amount not less than 15 per centum of the total appropriations for such year under the Hatch Act. The eligible institutions are authorized to plan and conduct agricultural research in cooperation with each other and such agencies, institutions, and individuals as may contribute to the solution of agricultural problems, and moneys appropriated pursuant to this section shall be available for paying the necessary expenses of planning, coordinating and conducting such cooperative research.
- b. Set-aside for Federal Administration: Three percent of the funds appropriated under this act is set aside for Federal administration. This includes disbursement of funds and review and evaluation of proposals.
4. Grants for Agricultural Research - (The Act of September 6, 1958, 42 U.S.C. 1891-1893, and the Act of August 4, 1965, 7 U.S.C. 450i; Public Law 95-113, September 29, 1977).

In fiscal year 1979, of the \$31,273,000 appropriated for this program, \$15,773,000 is for Special Research Grants, \$15,000,000 is for Competitive Research Grants, and \$500,000 is for Alcohol Fuels Research Grants.

This program provides special concentration on problems of national interest where such concentration is desirable or necessary beyond the normal emphasis in the formula grant program. The grants which are approved for a maximum of five years have two components, a Special Research Grant Program and a Competitive Research Grant Program.

Under the Special Research Grants component, which places major research emphasis on specific national problems identified by the Department and by the Congress, research on food and agriculture policies; soybeans; pest management; transportation, marketing and storage; genetic vulnerability; pesticide clearance; soil erosion in the Pacific Northwest; pesticide impact assessment; dried beans; soybean cyst nematode; beans and beets; animal health; mushroom byproduct utilization; and rural development centers has received emphasis in FY 1979. Research on alcohol fuels is also carried out in accordance with section 1419, Public Law 95-113.

Under the Competitive Research Grants component emphasis will be placed on basic research critical to food production and human nutrition by obtaining the participation of outstanding researchers in the entire U. S. scientific community.

5. Rural Development Research - (Title V, Rural Development Act of 1972, 7 U.S.C. 2661-2668; Public Law 94-259, April 5, 1976; Public Law 95-113, September 29, 1977).
  - a. Research Program: Funds under the Rural Development Act of 1972 are allotted to land-grant colleges and universities of the 50 States and Puerto Rico to conduct research programs in support of the development of rural areas. This program provides funds to expand scientific inquiry and educational backup for rural development. The higher educational and research institutions in each State including the 1890 Land-Grant Institutions are authorized to assist in developing and disseminating scientific information, technical assistance and feasibility studies required to improve the rural development capabilities of local citizens, agencies and governments.
  - b. Set-aside for Federal Administration: Four percent of the funds appropriated under the Rural Development Act is set aside for Federal administration. This includes disbursement of funds and review and evaluation of proposals. The review and evaluation includes consideration of the legislative requirements, of the quality of the proposal, and of potential impact of the research proposed on rural communities.
6. Animal Health and Disease Research - (The National Agricultural Research, Extension, and Teaching Policy Act of 1977, Section 1433, Public Law 95-113, September 29, 1977).
  - a. Research Program: Funds under Section 1433, P. L. 95-113, support livestock and poultry disease research in colleges of veterinary medicine and in eligible agricultural experiment stations. Distribution is by formula based on the relative importance of livestock and poultry production in the States and the capacity of eligible institutions to conduct this research. Research on specified national and regional problems of joint USDA-State concern also is conducted as agreed upon between the USDA and specific eligible institutions.
  - b. Set-aside for Federal Administration: Four percent of the funds appropriated under this act is set aside for Federal administration.
7. Federal Administration (direct appropriation) - Authority for direct appropriations is provided in the annual Agriculture, Rural Development, and Related Agencies Appropriations Act.

These funds are used to provide support services in connection with research planning and coordination of all programs administered by Cooperative Research.

JUSTIFICATION OF INCREASES AND DECREASES

- (1) A net decrease of \$4,663,000 for Special Research Grants (\$15,773,000 and \$500,000 available in 1979) as follows:

- (a) A decrease of \$1,300,000 for selected Special Research Grants (\$1,300,000 available in 1979) consisting of:

Soybean research .....	-\$500,000
Rural development centers .....	-300,000
Transportation, marketing and storage research ..	-500,000
	<u>-1,300,000</u>

Need for Change. This decrease is part of a realignment of research effort. Prior funding for specific research has directed research attention to certain important areas of research. At this time, sufficient studies on soybeans and transportation, marketing and storage research permit a withdrawal of this concentrated effort. Other means of coordination of rural development research can be utilized.

Nature of Change. Special research grants for these areas of research are proposed to be eliminated.

- (b) A decrease of \$263,000 for selected Special Research Grants (\$263,000 available in 1979) consisting of:

Dried bean research .....	-\$25,000
Bean and beet research .....	-50,000
Soybean cyst nematode research .....	-150,000
Mushroom byproduct utilization research .....	-38,000
	<u>-263,000</u>

Need for Change. The Special Research Grants program provides concentration on problems of national interest where such concentration is desirable or necessary beyond the normal emphasis in the formula grant program. The Department has determined that the above items are not of sufficient national importance to warrant continued concentration of research beyond FY 1979.

Nature of Change. Special research grants for these areas of research are proposed to be eliminated. Amounts allotted to the States on a formula basis permit State institutions to fund research in those areas that they identify as high priority and could be a possible source of funding for these programs if the States wished to continue the research.

- (c) A decrease of \$5,500,000 for selected Special Research Grants (\$10,500,000 available in 1979) consisting of:

Animal health research .....	-\$5,000,000
Alcohol fuels research .....	-500,000
	<u>-5,500,000</u>

Need for Change. The research grants funded in fiscal year 1979 will be projected over a period of up to five years for completion of studies. The level of funding provided and the time period of support provided by the FY 1979 grants will yield important information on the highest priority problems of animal health and alcohol fuels. As results of this research become known, an assessment can be made of the need for augmenting the base of scientific knowledge developed by these programs. \$5,000,000 of animal health Special Research Grants is being continued in FY 1980. This will provide for high priority work in addition to the grants awarded in FY 1979.

Nature of Change. Special research grants for alcohol fuels research are proposed to be eliminated and funds for animal health research are decreased. The most critical problems affecting the livestock and poultry industries will continue to receive high priority emphasis within the \$5,000,000 funding which is proposed to be continued in FY 1980.



- (d) An increase of \$2,400,000 for Special Research Grants (no funds available in 1979) for energy research related to crop and animal production and protection.

Need for Change. The principal raw material of modern U. S. agriculture is fossil fuel. Supplies of petroleum and natural gas are becoming depleted and more expensive. Costs may increase to the point that these energy sources are not affordable for many present farming practices (e.g., irrigation pumping and crop drying). Agriculture and food processing must become more efficient in the use of fossil fuels and products dependent on fossil fuels for their manufacture. Solar and wind energy can substitute for fossil fuels, particularly on farms and in small communities. Crop and animal residues are not being fully utilized. Idle and marginally utilized lands could be used to produce energy crops.

Nature of Change. The State agricultural experiment stations, schools of forestry, and the colleges of 1890 and Tuskegee Institute have been only minimally involved in research on the Nation's pressing energy problems, particularly as related to alternative energy sources. Scientists and engineers are available at the land-grant universities to initiate such research. Technology will be developed to permit the economic substitution of energy from solar, wind, and biomass for crop drying; heating livestock shelters and greenhouses; irrigation pumping; processing; and other rural and agricultural uses. Crop and forest species will be screened and evaluated as sources of biomass with emphasis on those that can be grown on set-aside and marginal lands. Production practices for energy crops will be developed. Greater attention will be given to energy efficient crops and animal production systems. Better utilization of crop residues and animal wastes, such as by the production of methane and single cell protein, will be sought. The research will provide technology and support for solar energy demonstration farms.

- (2) An increase of \$15,000,000 for Competitive Research Grants (\$15,000,000 available in 1979).

The Competitive Research Grants program is to provide special emphasis on basic research critical to enhancing food production and to improving human nutrition. The competitive grants are to complement the ongoing research efforts of the USDA and the traditional agricultural research community by obtaining the participation of research scientists throughout the entire U. S. scientific community who have outstanding expertise in these related areas.

- (a) An increase of \$11,000,000 for Competitive Research Grants for plant science research targeted to crop production (\$10,000,000 available in 1979).

Need for Change. The four areas of plant science research selected for increased support provide great opportunities to develop fundamental knowledge necessary to increase crop productivity and the dependability of the food supply. The target areas relating to crop productivity are photosynthesis, biological nitrogen fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses (e.g., insect, pathogens, viruses, and nematodes). The number and quality of the research proposals received in fiscal year 1978 demonstrated extensive availability of high quality research capability for additional research in this program. Basic research needs are:

Biological Nitrogen Fixation - Adequate supplies of nitrogen are essential to crop productivity. Increased crop yields during the past 25 years have paralleled increased use of nitrogen fertilizer. For several reasons, including energy costs, existing biologic technologies for providing nitrogen to crops need to be improved, and new technologies developed.

Genetic Mechanisms for Crop Improvement - Determine those plant processes and characteristics which can be used by plant breeders in manipulating plant varieties to increase crop productivity. The research is intended to identify new ways of transferring desirable genes to plant species used by man. Conventional plant breeding methods can be used to transfer germplasm only among close relatives in the plant kingdom. Biochemists and plant physiologists must be brought into an active team participation with plant breeders and other scientists working with genetic and cultural improvement of crops. Studies are needed to use tissue culture techniques and other novel approaches to accelerate genetic improvement of crop plants. An understanding of the genetic systems of crop plants and their regulation is an essential requirement. The development of cellular and molecular methods would permit identification of desirable plant characteristics (or genes) and facilitating their transfer among plants.

Photosynthesis - Since 95 percent of the dry weight of plants is a result of photosynthesis, studies on this process have high priority in efforts to improve crop productivity. Studies are needed to determine the fundamental biology involved in more efficient partitioning of the products of photosynthesis into food products of high nutritional value. Expansion of research to develop new methodology for plant breeders would help in identifying and incorporating improved photosynthetic efficiency into crops. Identification of aspects of photosynthesis which limit the conversion of solar energy into stable chemical products (sugars, starch, etc.) is highly important if attempts at enhancing photosynthetic efficiency are to be successful.

Biological Stresses on Plants - Plant pests are a major limitation to high crop productivity. Progress in reducing pest losses has been impeded by the rapid obsolescence of available technology, by various changes in production practices, and by the genetic changes in the pests affecting crop productivity. Studies are needed on the effects of pests and adverse environmental stress effects that result from pests and methods of combating them. Emphasis will be on stresses caused by weeds, nematodes, pest insects, and pathological micro-organisms. Attempts will be made to identify how plants react to stressful interactions and how damage from such interactions may be reduced or eliminated.

Nature of Change. Enhanced funding will permit funding of a greater number of the highly meritorious and relevant research projects. Research will be conducted on the four crop productivity areas of photosynthesis, nitrogen fixation, genetic engineering for plants, and biological stress on plants. Distribution of funds among the four areas will be based on the selection of projects from all areas on the basis of their scientific merits and relevance. Capable scientists from universities, private sector research, and government agencies will be encouraged to apply for the grants.

- (b) An increase of \$4,000,000 for Competitive Research Grants for human nutrition research. (\$5,000,000 available in 1979.)

Need for Change. Although much is known about human nutrition, the base of research knowledge needs to be expanded if we are to make sound recommendations to improve dietary practices for humans. Research at the cellular level, for example, has established many of the metabolic pathways which function in humans. Such knowledge must be expanded above the cellular level to where we can understand what happens nutritionally with the total organism. There could be immense benefits from this research. Planning food production on the



basis of nutritional needs for people, for example, could bring about the best uses of agricultural resources. Better knowledge of the nutritional requirements at each stage of the life cycle would make it possible to design food programs to maintain longer, more productive, and satisfying lives. This research would move a step closer in meeting the national goal of USDA to provide foods to assure adequate diets to all. Food choices and buying habits are changing rapidly and dramatically. Those basic social-behavioral factors which affect eating and buying habits must be understood. The availability of an adequate diet is not sufficient if improper food selections are made. We must research the basis for these trends and how to change them. Overall, an expanded nutritional research program can contribute to strengthening the Nation's economy and to the well-being of its citizens.

Nature of Change. Research effort will be expanded in the areas of human requirements necessary for optimum growth and well-being, and factors affecting food preferences and food habits. Emphasis will be placed on the biochemical and metabolic relationships of the nutrients consumed by the United States populations. Research will focus also on the determinants of food habits and interactions of food availability, acceptability, safety and nutritive value. Distribution of funds among the two programs in human nutrition -- nutrient requirements and social-behavioral factors affecting food choice -- will be based on selection of projects based on scientific merit and relevance. Capable scientists regardless of organizational affiliation will be encouraged to apply for grants.

- (3) A decrease of \$1,500,000 for rural development research (\$1,500,000 available in 1979).

Need for Change. This program has been implemented on a pilot basis since FY 1974 and at this time the pilot program is not sufficiently high priority on a national basis, to fund when considering overall budget constraints and economic factors.

Nature of Change. The pilot program will be terminated. However, states which determine that their research is of sufficient priority may continue rural development research efforts as a part of their ongoing programs.

- (4) A decrease of \$5,000,000 for Animal Health and Disease Research (\$5,000,000 available in 1979).

Need for Change. This activity was first funded in FY 1979. Under the formula provisions required for this program the funds distributed to many States are not sufficient to support a viable program. Health and disease research is conducted by Federal and State research institutions which contributes toward solution of problems of national significance.

Nature of Change. This segment of the animal health and disease research program is proposed for elimination. The overall animal health and disease research program will be sustained through the ongoing federal and state research programs. States may continue the research initiated under this program as a part of their ongoing programs as warranted.

- (5) A net increase of \$85,000 for Federal administration (direct appropriation) (\$1,696,000 available in 1979) consisting of:

- (a) A decrease of \$46,000 for reduced travel.
- (b) An increase of \$131,000 for FY 1979 pay increases.





## STATUS OF PROGRAM

The funds appropriated for Cooperative Research provide the Federal Government's contribution to land-grant agricultural experiment stations, approved schools of forestry, the 1890 land-grant institutions and Tuskegee Institute, and other eligible institutions in the various States and in Puerto Rico, Guam, the Virgin Islands, and the District of Columbia. The appropriation is established pursuant to the provisions of the Hatch Act of 1887, as amended by the Act of August 11, 1955, and further amended by Public Law 92-318, approved June 23, 1972, and further amended by Public Law 93-471, approved October 26, 1974, and further amended by Public Law 95-113, approved September 29, 1977; Cooperative Forestry Research Act of October 10, 1962, as amended by Public Law 92-318, approved June 23, 1972; Payments to 1890 Colleges and Tuskegee Institute under Section 1445 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977, Public Law 95-113, approved September 29, 1977, as amended by Public Law 95-547, approved October 28, 1978; Grants for Agricultural Research, Public Law 89-106, approved August 4, 1965, as amended by Public Law 95-113, approved September 29, 1977; Rural Development Act of 1972, Title V of Public Law 92-419, approved August 30, 1972, as amended; and Animal Health and Disease Research under Section 1433 of the National Agricultural Research, Extension, and Teaching Policy Act of 1977, Public Law 95-113, approved September 29, 1977.

The State institutions conduct research and experiments on the problems constantly encountered in the development of a permanent and sustaining agriculture and forestry, and in the improvement of the economic and social welfare of rural and urban families. Because of differences in climate, soil, market outlets, and other local conditions, each State has distinct problems in the production and marketing of crops and livestock. Farmers, foresters, and rural people in the individual States naturally look to their State agricultural experiment stations, universities and colleges for solution of the State and local problems and request services to help meet changing conditions.

Research programs at State institutions, to be most effective, include participation in regional and national programs. Joint attack by a group of State institutions is the most effective and often the only practical approach to problems of common interest. The stations are acting together as regional groups to provide cooperative coordinated attacks on problems of regional and national interest. In a similar manner, the research programs of the State institutions and the Department of Agriculture are supplementary and interdependent.

The Federal formula funds constitute a powerful force in bringing about inter-State cooperation and Federal-State collaboration in the planning and conduct of this overall program of agricultural research. Therefore, the impact of the Federal formula funds cannot be fully evaluated solely on the basis of the amount of funds provided.

Research at the State institutions is organized into a program of projects that is submitted for approval by the Service. The program of projects is financed wholly or in part from Federal formula and grant funds. Programs and projects are evaluated periodically with station scientists by administrators and technical staff of Cooperative Research. The evaluation includes consideration of quality and productivity of the program and projects. The continuing process of research evaluation by station scientists and the staff of Cooperative Research results in a dynamic program with approximately 15 to 20 percent of the projects being replaced by new and/or revised projects each year.

Distribution of Payments:

Hatch Act: The Agricultural Experiment Stations Act of August 11, 1955 (Hatch Act, as amended) provides that the distribution of Federal payments to States for fiscal year 1955 shall become a fixed base and that any sums appropriated in excess of the 1955 level shall be distributed in the following manner:

- 20% shall be allotted equally to each State.
- not less than 52% shall be allotted to the States as follows:
  - one-half in an amount proportionate to the relative rural population of each State to the total rural population of all States, and
  - one-half in an amount proportionate to the relative farm population of each State to the total farm population of all States.
- not more than 25% shall be allotted to the States for cooperative research in which two or more State agricultural experiment stations are cooperating to solve problems that concern the agriculture of more than one State.
- 3% shall be available to the Secretary of Agriculture for the administration of this Act.

The Act also provides that any amount in excess of \$90,000 available for allotment to any State, exclusive of the regional research fund, shall be matched by the State out of its own funds for research, and for the establishment and maintenance of facilities necessary for the prosecution of such research.

Cooperative Forestry Research: The Cooperative Forestry Research Act of October 10, 1962, provides that the apportionment among States shall be determined by the Secretary after consultation with a national advisory board of not less than seven officials of the forestry schools of the State-certified eligible colleges and universities chosen by a majority of such schools. In making such apportionments consideration shall be given to pertinent factors including, but not limited to, areas of non-Federal commercial forest land and volume of timber cut annually from growing stock. The Act also limits the payments to the amount made available and budgeted from non-Federal sources by the certified institutions for expenditure for forestry research.

Payments to 1890 Colleges and Tuskegee Institute: The National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Public Law 95-113), as amended, provides for support of continuing agricultural research at colleges eligible to receive funds under the Act of August 30, 1890, including Tuskegee Institute. Beginning with fiscal year 1979, there shall be appropriated funds for each fiscal year, an amount not less than 15% of the total for such year under section 3 of the Act of March 2, 1887. These funds shall be distributed as follows:

- 3% shall be available to the Secretary of Agriculture.
- Payments to States in fiscal year 1978 is a fixed base. Of funds in excess of this amount:
  - 20% shall be allotted equally to each State.
  - 40% shall be allotted in an amount proportionate to the rural population of the State in which the eligible institution is located to the total rural population of all the States in which eligible institutions are located, and
  - 40% shall be allotted in an amount proportionate to the farm population of the State in which the eligible institution is located to the total farm population of all the States in which eligible institutions are located.

Allotments to Tuskegee Institute and Alabama A&M University shall be determined as if each institution were in a separate State.



Grants for Agricultural Research: Section 2 of the Act of August 4, 1965, as amended (7 U.S.C. 450i) authorizes grants to State agricultural experiment stations, all colleges and universities, other research institutions and organizations, Federal agencies, private organizations or corporations, and individuals, for research to further the programs of the Department of Agriculture. In fiscal year 1979, \$15,773,000 of the \$31,273,000 appropriated for this program is for Special Research Grants, \$15,000,000 is for Competitive Research Grants, and \$500,000 is for alcohol fuels research grants in accordance with Section 1419 of Public Law 95-113.

The program of Competitive Research Grants was initiated in 1978 by a \$15 million appropriation to fund basic research in selected high-priority areas related to food production and human nutrition. The competitive grants are to complement the ongoing research efforts of the USDA and the traditional agricultural research community by obtaining the participation of research scientists throughout the entire U. S. scientific community who have outstanding expertise in these and related areas. The important and unique complimentary nature of the Competitive Research Grants for basic research to the continuing research programs of the USDA and cooperating State institutions is in furtherance of the intent of the Congress as stated in the Food and Agriculture Act of 1977.

The four target areas relating to crop productivity are photosynthesis, biological nitrogen fixation, genetic mechanisms for crop improvement, and plant protection from biological stresses (e.g., insects, pathogens, viruses, and nematodes). Those in human nutrition relate to establishing nutrient requirements for normal humans of all age groups and to gaining new insights into the social and behavioral factors affecting food choices and food habits.

The targeted areas were identified as possessing great opportunities for scientific discoveries and for contributing to applied research vitally needed on important food problems. These areas had been highlighted by a number of national and international studies including the National Academy of Sciences "World Food and Nutrition Study," the USDA/SAES Kansas City Conference on "Research to Meet U.S. and World Food Needs," the MSU/Kettering Conference on "Crop Productivity-Research Imperatives," and the Congressional Office of Technology Assessment on "Organizing and Financing Basic Research to Increase Food Production."

The Competitive Research Grants Office received 1,109 research proposals in FY 1978 requesting about \$250 million for support of the research targeted in the six research areas. From these proposals, 197 grants were made in the areas, for the amounts, and to the types of research organizations noted below. Less than one-third of the research proposals which were evaluated by ad hoc and peer panel reviewers and competitive research grants office scientists to represent good to excellent science related to the mission of this program was funded. Clearly, the broad scientific community mandated by Congress was reached and research important to the mission of the program has been supported.

	<u>Proposals</u>	<u>Grants</u>	
		<u>Numbers</u>	<u>Millions</u>
Plant Biology			
Biological Stress .....	271	43	\$2.855
Genetic Mechanisms .....	185	42	2.693
Photosynthesis .....	182	48	2.372
Nitrogen Fixation .....	132	26	1.680
Subtotal .....	770	159	9.600
Human Nutrition			
Nutrition Requirements .....	262	28	3.730
Behavioral Factors .....	77	10	1.070
Subtotal .....	339	38	4.800
Total .....	1,109	197	14.400

These proposals were submitted by scientists located at 205 different research organizations in 49 States, the District of Columbia, and Puerto Rico as summarized below. The 1,109 proposals were received from five basic categories of organizations in the numbers indicated. Grants were made to 80 different grantee organizations in 41 States, and the District of Columbia. The distribution among the major categories of grantee organizations is noted.

	<u>Proposals</u>	<u>Grants</u>
Land-Grant Universities .....	722	122
Other Public Universities .....	143	26
Private Universities .....	122	28
Federal Agencies .....	67	12
Other Nonacademic Organizations .....	55	9
Total .....	<u>1,109</u>	<u>197</u>

Rural Development Research: The Rural Development Act of 1972, as amended, provides that funds be allocated as follows:

- 20% shall be allocated equally to each State.
- 66% shall be allocated to each State as follows:
  - one-half in an amount proportionate to the relative rural population of each State to the total rural population of all States, and
  - one-half in an amount proportionate to the relative farm population of each State to the total farm population of all States.
- 10% shall be allocated to the States for research serving two or more States in which universities in two or more States cooperate or which is conducted by one university to serve two or more States.
- 4% shall be available to the Secretary of Agriculture for Federal administration, national coordination, and program assistance to the States.

Animal Health and Disease Research: The National Agricultural Research, Extension, and Teaching Policy Act of 1977 (Public Law 95-113) provides for support of live-stock and poultry disease research in colleges of veterinary medicine and in eligible State agricultural experiment stations. These funds shall be distributed as follows:

- 4% shall be retained by the Department of Agriculture for administration, program assistance to the eligible institutions, and program coordination.
- 48% shall be distributed in an amount proportionate to the value of and income to producers from domestic livestock and poultry in each State to the total value of and income to producers from domestic livestock and poultry in all the States.
- 48% shall be distributed in an amount proportionate to the animal health research capacity of the eligible institutions in each State to the total animal health research capacity in all the States.

Penalty Mail: The Hatch Act of 1887, as amended (7 U.S.C. 361f), provides for the mailing under penalty indicia by agricultural experiment stations of bulletins, reports, periodicals, reprints of articles, and other publications, including lists of publications necessary for dissemination of results of research. Mailings includes not only those to individual farmers upon request but also to newspapers, libraries, other experiment stations, and organizations interested in results of research and dissemination of such results.

Under title 39 U.S.C. 3206(b) and 3203(a)(4), the Department paid to the U. S. Postal Service \$374,000 to cover postage of mail sent under the penalty privilege by the State agricultural experiment stations during fiscal year 1978. Funds of \$476,000 have been set-aside from the fiscal year 1979 appropriation under the Hatch Act for payments to the U. S. Postal Service.

Table 1  
Distribution of Federal Payments to States for Research at State Agricultural Experiment  
Stations and Other State Institutions - Fiscal Year 1978

State	Hatch Act, as amended			Cooperative:			Grants for			Total		
	Regular	Regional	Total	Forestry	Research	(M-S)	Institute	Research	Development	Act	Other Funds	Federal Grant Funds
Alabama	2,004,970	507,871	2,512,841	317,675			1,774,308		27,948			4,632,772
Alaska	543,928	86,455	630,383	137,061					7,340			774,784
Arizona	734,960	456,699	1,191,659	124,605					10,478			1,326,742
Arkansas	1,694,141	445,091	2,139,232	292,763			762,624	250,000	24,529			3,469,148
California	2,129,802	971,646	3,101,448	323,904				530,000	32,862			3,988,214
Colorado	967,443	559,365	1,526,808	174,430					15,092			1,716,330
Connecticut	828,541	299,437	1,127,978	99,693					12,920			1,240,591
Delaware	582,565	224,072	806,637	56,096			329,135		7,908			1,199,776
District of Columbia	90,000	34,068	124,068									124,068
Florida	1,329,846	404,118	1,733,964	255,395			569,478	300,390	21,925			2,881,152
Georgia	2,179,685	647,679	2,827,364	330,132			938,710	38,420	32,135			4,166,761
Guam	459,581	73,878	533,459									533,459
Hawaii	595,540	231,779	827,319	74,781					7,392			909,492
Idaho	896,024	372,843	1,268,867	211,798				260,000	14,215			1,754,880
Illinois	2,597,105	608,390	3,205,495	180,658				70,000	47,489			3,503,642
Indiana	2,348,111	553,572	2,901,683	149,518				346,600	43,813			3,441,614
Iowa	2,434,443	786,231	3,220,674	118,377				75,000	83,716			3,497,767
Kansas	1,542,884	509,676	2,052,560	81,009					26,419			2,159,988
Kentucky	2,451,487	505,213	2,956,700	205,570			961,872		41,640			4,165,782
Louisiana	1,563,796	419,444	1,983,240	298,991			693,386		23,537			2,999,154
Maine	815,248	312,027	1,127,275	274,079					11,585			1,412,939
Maryland	1,113,497	392,997	1,506,494	143,289			501,609		17,723			2,169,115
Massachusetts	976,543	383,418	1,359,961	130,833					14,871			1,505,665
Michigan	2,409,594	540,716	2,950,310	280,307				334,561	42,727			3,607,905
Minnesota	2,310,394	558,545	2,868,939	230,482					43,516			3,142,937
Mississippi	2,103,050	510,740	2,613,790	305,219			930,740	75,000	66,546			3,991,295
Missouri	2,273,002	480,766	2,753,768	224,254			882,049	84,000	39,131			3,983,202
Montana	854,346	403,022	1,257,368	193,114					13,518			1,464,000
Nebraska	1,413,967	546,084	1,960,051	68,553					24,703			2,053,307
Nevada	534,744	220,899	755,643	49,868					7,166			812,677
New Hampshire	653,461	224,505	877,966	168,202					9,298			1,055,466
New Jersey	959,716	614,378	1,574,094	105,921				400,000	14,898			2,094,913
New Mexico	762,569	242,850	1,005,419	112,149				1,500,000	10,802			2,628,370
New York	2,365,558	907,471	3,273,029	286,535				547,590	78,037			4,185,191
North Carolina	3,281,914	725,343	4,007,257	311,447			1,279,299	252,103	52,593			5,902,699
North Dakota	1,074,846	362,798	1,437,644	37,412				25,000	17,737			1,517,793



State	Hatch Act, as amended			Cooperative:				Grants for:			Total	
	Regular	Regional	Total	Forestry	Research	Institute	Rural	Agricultural	Development	Other	Funds	Funds
	Formula	Research		(M-S)			Act					
Ohio .....	2,848,291	583,524	3,431,815	186,886			50,843	408,500				4,078,044
Oklahoma .....	1,504,428	365,865	1,870,293	161,974		665,366	23,336					2,720,969
Oregon .....	1,114,895	572,065	1,686,960	336,360			55,455	225,000				2,303,775
Pennsylvania .....	2,892,856	733,026	3,625,882	242,939			49,096	824,900				4,742,817
Puerto Rico .....	2,295,786	452,557	2,748,343				34,225	10,794				2,793,362
Rhode Island .....	525,984	226,838	752,822	43,640			7,119					803,581
South Carolina .....	1,744,699	419,855	2,164,554	249,167		778,066	24,517					3,216,304
South Dakota .....	1,092,771	365,513	1,458,284	62,325			18,560					1,539,169
Tennessee .....	2,422,972	520,082	2,943,054	218,026		978,559	38,662					4,178,301
Texas .....	3,078,688	740,293	3,818,981	267,851		1,238,204	48,565	299,000				5,672,601
Utah .....	674,241	416,245	1,090,486	93,465			9,264					1,193,215
Vermont .....	698,603	195,232	893,835	155,746			10,114					1,059,695
Virginia .....	2,085,687	472,505	2,558,192	261,623		869,595	32,386	70,000				3,791,796
Virgin Islands .....	125,139	53,394	178,533					8,142				186,675
Washington .....	1,273,111	788,253	2,061,364	342,588			20,705	150,000				2,574,657
West Virginia .....	1,351,758	327,199	1,678,957	199,342			18,765					1,897,064
Wisconsin .....	2,319,213	639,093	2,958,306	236,711			43,317	150,000				3,388,334
Wyoming .....	626,581	321,659	948,240	87,237			8,862					1,044,339
Other .....	472,765	148,000	620,765									620,765
Subtotal .....	81,025,769	24,465,284	105,491,053	9,500,000		14,153,000	1,440,000	7,235,000				137,819,053
Committee of Nine (Travel) .....		10,080	10,080									10,080
Unobligated balance .....	126,019	33,699	159,718									159,718
Subtotal .....	81,151,788	24,509,063	105,660,851	9,500,000		14,153,000	1,440,000	7,235,000				137,988,851
Federal Administration:												
Hatch funds (3%) .....												
Unobligated balance .....			2,841,466									2,841,466
Rural development funds (4%) ..			189,683									189,683
Direct appropriation .....												60,000
Subtotal .....												1,693,836 1/
Penalty Mail .....			3,031,149				60,000					4,784,985
TOTAL .....	81,151,788	24,509,063	109,066,000	9,500,000		14,153,000	1,500,000	7,235,000				143,147,836

1/ Excludes \$2,164 transferred to Office of Secretary.

Table 2  
Available Funds for Cooperative Research  
Fiscal Years 1978, 1979, and 1980  
(In Dollars)

State	1978 Actual	1979 Estimate	1980 Estimate
1. Payments under the Hatch Act:			
a. Distributed by formula:			
Alabama .....	\$2,004,970	\$2,003,411	\$2,003,411
Alaska .....	543,928	543,472	543,472
Arizona .....	734,960	734,336	734,336
Arkansas .....	1,694,141	1,692,765	1,692,765
California .....	2,129,802	2,127,981	2,127,981
Colorado .....	967,443	966,572	966,572
Connecticut .....	828,541	828,389	828,389
Delaware .....	582,565	582,079	582,079
District of Columbia .....	90,000	331,246	331,246
Florida .....	1,329,846	1,328,610	1,328,610
Georgia .....	2,179,685	2,177,903	2,177,903
Guam .....	459,581	459,171	459,171
Hawaii .....	595,540	595,081	595,081
Idaho .....	896,024	895,200	895,200
Illinois .....	2,597,105	2,594,500	2,594,500
Indiana .....	2,348,111	2,345,703	2,345,703
Iowa .....	2,434,443	2,431,906	2,431,906
Kansas .....	1,542,884	1,541,667	1,541,667
Kentucky .....	2,451,487	2,453,768	2,453,768
Louisiana .....	1,563,796	1,562,474	1,562,474
Maine .....	815,248	814,565	814,565
Maryland .....	1,113,497	1,112,486	1,112,486
Massachusetts .....	976,543	977,861	977,861
Michigan .....	2,409,594	2,408,627	2,408,627
Minnesota .....	2,310,394	2,308,001	2,308,001
Mississippi .....	2,103,050	2,101,432	2,101,432
Missouri .....	2,273,002	2,270,844	2,270,844
Montana .....	854,346	853,559	853,559
Nebraska .....	1,413,967	1,412,582	1,412,582
Nevada .....	534,744	534,298	534,298
New Hampshire .....	653,461	652,901	652,901
New Jersey .....	959,716	958,856	958,856
New Mexico .....	762,569	761,928	761,928
New York .....	2,365,558	2,363,326	2,363,326
North Carolina .....	3,281,914	3,279,037	3,279,037
North Dakota .....	1,074,846	1,073,834	1,073,834
Ohio .....	2,848,291	2,845,507	2,845,507
Oklahoma .....	1,504,428	1,503,116	1,503,116
Oregon .....	1,114,895	1,113,871	1,113,871
Pennsylvania .....	2,892,856	2,890,166	2,890,166
Puerto Rico .....	2,295,786	2,293,891	2,293,891
Rhode Island .....	525,984	543,560	543,560
South Carolina .....	1,744,699	1,743,324	1,743,324
South Dakota .....	1,092,771	1,091,714	1,091,714
Tennessee .....	2,422,972	2,420,840	2,420,840
Texas .....	3,078,688	3,076,026	3,076,026
Utah .....	674,241	673,682	673,682
Vermont .....	698,603	698,054	698,054
Virginia .....	2,085,687	2,083,891	2,083,891
Virgin Islands .....	125,139	452,111	452,111
Washington .....	1,273,111	1,271,940	1,271,940
West Virginia .....	1,351,758	1,350,691	1,350,691
Wisconsin .....	2,319,213	2,319,330	2,319,330
Wyoming .....	626,581	626,263	626,263
Other .....	472,765	...	...
Subtotal .....	81,025,769	81,078,348	81,078,348
b. Regional research funds <u>a/</u> .....	24,465,284	24,471,563	24,471,563
Committee of Nine travel .....	10,080	12,000	12,000
Total agricultural research			
under the Hatch Act .....	105,501,133	105,561,911	105,561,911
For administration .....	2,841,466	3,028,089	3,028,089
For penalty mail .....	374,000	476,000	476,000
Subtotal .....	108,716,599	109,066,000	109,066,000

	1978	1979	1980
	Actual	Estimate	Estimate
2. Cooperative forestry research:			
Research program <u>b/</u> .....	\$9,500,000	\$9,500,000	\$9,215,000
For administration .....	...	...	285,000
Subtotal .....	9,500,000	9,500,000	9,500,000
3. Payments to 1890 colleges and Tuskegee Institute:			
Research program .....	14,153,000	15,869,200	15,869,200
For administration .....	...	490,800	490,800
Subtotal .....	14,153,000	16,360,000	16,360,000
4. Special research grants:			
Research program .....	7,235,000	15,484,810	11,261,700
For administration .....	...	488,190	348,300
Subtotal .....	7,235,000	<u>c/</u> 16,273,000	11,610,000
5. Competitive research grants:			
Research program .....	14,400,000	14,550,000	29,100,000
For administration .....	600,000	450,000	900,000
Subtotal .....	<u>d/</u> 15,000,000	15,000,000	30,000,000
6. Rural development and small farm research:			
Research program .....	1,440,000	1,440,000	...
For administration .....	60,000	60,000	...
Subtotal .....	1,500,000	1,500,000	...
7. Animal health and disease research:			
Research program .....	...	4,800,000	...
For administration .....	...	200,000	...
Subtotal .....	...	5,000,000	...
8. Federal administration (direct appropriation .....	1,693,836	1,696,000	1,781,000
Unobligated balance .....	349,401	...	...
Subtotal, appropriated funds <u>e/</u> .....	158,147,836	174,395,000	178,317,000
Reimbursements .....	509,365	300,000	300,000
Allotments from:			
Forest Service .....	1,098,700	1,097,000	1,097,000
Environmental Protection Agency .....	550,000	...	...
Trust Fund .....	2,958	...	...
Total available or estimate .....	160,308,859	175,792,000	179,714,000

- a/ Allotted to States on the basis of recommendation by a committee of experiment station directors and approved by Cooperative Research.
- b/ Apportioned among the States on a basis determined by the Secretary after consultation with a national advisory board of not less than seven officials of forestry schools selected by eligible institutions.
- c/ Includes \$500,000 for alcohol fuels research grants in accordance with section 1419 of Public Law 95-113.
- d/ 1978 amounts were apportioned to the Agricultural Research Service. They are included here to reflect comparability with the 1979 budget.
- e/ Excludes \$2,164 transferred to Office of Secretary.



Table 3  
Estimated Distribution by Research Programs of Federal Payments  
to State Agricultural Experiment Stations, Schools of Forestry,  
and 1890 Land-Grant Institutions and Tuskegee Institute  
Fiscal Year 1979 (In thousands of dollars)

	<u>1979</u>
Natural Resources Programs	
Soil and land use .....	\$ 4,725
Water and watersheds <u>1/</u> .....	1,282
Environmental quality .....	6,667
Fish and wildlife .....	728
Outdoor recreation .....	622
Weather .....	509
Remote sensing .....	54
Forestry Resources Programs	
Forestry <u>2/</u> .....	11,253
Crop Resources Programs	
Protection from disease, insect pests, and weeds <u>3/</u> .....	19,583
Crop varieties and production systems for dependable and efficient production .....	32,572
Quality improvement, quality maintenance, and marketing of crops ..	7,272
Animal Resources Programs	
Meat animal research .....	22,233
Dairy research .....	10,179
Poultry research .....	6,237
Other animal research .....	1,788
Aquatic foods and feedstuffs .....	930
Quality improvement, quality maintenance, and marketing of animal products .....	5,740
People, Communities, and Institutions Resources Programs	
Food and nutrition .....	11,405
Food safety .....	2,613
Rural development .....	10,078
Insects affecting man .....	436
Competition, Trade Adjustments and Price and Income Policy	
Farm adjustments necessary to increase farm income .....	2,895
Marketing and competition .....	7,705
Penalty Mail .....	476
Federal Administration .....	<u>6,413</u>
GRAND TOTAL .....	<u><u>174,395</u></u>

1/ Includes water pollution.

2/ McIntire-Stennis funds are also included under other appropriate resource programs.

3/ Includes activities to reduce or avoid the use of pesticides.

Table 4  
Available Funds for McIntire-Stennis Cooperative  
Forestry Research for Fiscal Years 1978, 1979, and 1980  
(In Dollars)

	1978 <u>Actual</u>	1979 <u>Estimate</u>	1980 <u>Estimate</u>
Alabama	\$317,675	\$317,675	\$307,875
Alaska	137,061	130,833	151,146
Arizona	124,605	124,605	139,089
Arkansas	292,763	292,763	289,791
California	323,904	323,904	313,904
Colorado	174,430	149,518	133,061
Connecticut	99,693	99,693	102,921
Delaware	56,096	56,096	54,696
Florida	255,395	255,395	235,539
Georgia	330,132	330,132	319,932
Guam	...	...	...
Hawaii	74,781	74,781	72,781
Idaho	211,798	211,798	211,426
Illinois	180,658	180,658	175,258
Indiana	149,518	161,974	145,118
Iowa	118,377	112,149	108,949
Kansas	81,009	81,009	84,837
Kentucky	205,570	205,570	199,370
Louisiana	298,991	298,991	277,735
Maine	274,079	274,079	265,679
Maryland	143,289	143,289	121,005
Massachusetts	130,833	137,061	114,977
Michigan	280,307	286,535	283,763
Minnesota	230,482	230,482	223,482
Mississippi	305,219	305,219	295,819
Missouri	224,254	224,254	217,454
Montana	193,114	193,114	187,314
Nebraska	68,553	68,553	60,725
Nevada	49,868	49,868	48,668
New Hampshire	168,202	174,430	163,202
New Jersey	105,921	105,921	96,893
New Mexico	112,149	118,377	127,033
New York	286,535	261,623	259,651
North Carolina	311,447	311,447	301,847
North Dakota	37,412	37,412	36,612
Ohio	186,886	186,886	181,286
Oklahoma	161,974	155,746	157,174
Oregon	336,360	342,588	331,988
Pennsylvania	242,939	242,939	229,511
Puerto Rico	...	...	...
Rhode Island	43,640	43,640	42,640
South Carolina	249,167	249,167	247,595
South Dakota	62,325	62,325	66,753
Tennessee	218,026	218,026	205,398
Texas	267,851	267,851	253,623
Utah	93,465	93,465	90,865
Vermont	155,746	168,202	169,230
Virginia	261,623	280,307	271,707
Virgin Islands	...	...	...
Washington	342,588	336,360	325,960
West Virginia	199,342	199,342	193,342
Wisconsin	236,711	236,711	241,567
Wyoming	87,237	87,237	78,809
Subtotal	9,500,000	9,500,000	9,215,000
Federal Administration (3%)	...	...	285,000
TOTAL	9,500,000	9,500,000	9,500,000

Table 5  
Payments to 1890 Colleges and Tuskegee Institute  
(In Dollars)

	Special Grant Funds P. L. 89-106	P. L. 95-113	
	1978 <u>Actual</u>	1979 <u>Estimate</u>	1980 <u>Estimate</u>
ALABAMA			
Alabama A&M University	\$896,992	\$990,037	\$990,037
Tuskegee Institute	877,316	970,361	970,361
ARKANSAS			
University of Arkansas at Pine Bluff	762,624	845,049	845,049
DELAWARE			
Delaware State College	329,135	355,956	355,956
FLORIDA			
Florida A&M University	569,478	641,880	641,880
GEORGIA			
Fort Valley State College	938,710	1,045,260	1,045,260
KENTUCKY			
Kentucky State University	961,872	1,102,248	1,102,248
LOUISIANA			
Southern University	693,386	771,624	771,624
MARYLAND			
University of Maryland - Eastern Shore	501,609	560,494	560,494
MISSISSIPPI			
Alcorn State University	930,740	1,028,148	1,028,148
MISSOURI			
Lincoln University	882,049	1,014,068	1,014,068
NORTH CAROLINA			
North Carolina A&T State University	1,279,299	1,454,348	1,454,348
OKLAHOMA			
Langston University	665,366	744,029	744,029
SOUTH CAROLINA			
South Carolina State College	778,066	859,378	859,378
TENNESSEE			
Tennessee State University	978,559	1,108,354	1,108,354
TEXAS			
Prairie View A&M College	1,238,204	1,400,656	1,400,656
VIRGINIA			
Virginia State College	<u>869,595</u>	<u>977,310</u>	<u>977,310</u>
Subtotal	14,153,000	15,869,200	15,869,200
Federal Administration (3%)	<u>- -</u>	<u>490,800</u>	<u>490,800</u>
TOTAL	<u>14,153,000</u>	<u>16,360,000</u>	<u>16,360,000</u>



Table 6  
Payments to States - Title V, Rural Development Act of 1972  
Fiscal Years 1978 and 1979 a/  
(In Dollars)

State	1978 Actual	1979 Estimate
Alabama	\$27,948	\$27,948
Alaska	7,340	7,340
Arizona	10,478	10,478
Arkansas	24,529	24,529
California	32,862	32,862
Colorado	15,092	15,092
Connecticut	12,920	12,920
Delaware	7,908	7,908
Florida	21,925	21,925
Georgia	32,135	32,135
Hawaii	7,392	7,392
Idaho	14,215	14,215
Illinois	47,489	47,489
Indiana	43,813	43,813
Iowa	83,716	46,216
Kansas	26,419	26,419
Kentucky	41,640	41,640
Louisiana	23,537	23,537
Maine	11,585	11,585
Maryland	17,723	17,723
Massachusetts	14,871	14,871
Michigan	42,727	42,727
Minnesota	43,516	43,516
Mississippi	66,546	29,046
Missouri	39,131	39,131
Montana	13,518	13,518
Nebraska	24,703	24,703
Nevada	7,166	7,166
New Hampshire	9,298	9,298
New Jersey	14,898	14,898
New Mexico	10,802	10,802
New York	78,037	40,537
North Carolina	52,593	52,593
North Dakota	17,737	17,737
Ohio	50,843	50,843
Oklahoma	23,336	23,336
Oregon	55,455	17,955
Pennsylvania	49,096	49,096
Puerto Rico	34,225	34,225
Rhode Island	7,119	7,119
South Carolina	24,517	24,517
South Dakota	18,560	18,560
Tennessee	38,662	38,662
Texas	48,565	48,565
Utah	9,264	9,264
Vermont	10,114	10,114
Virginia	32,386	32,386

State	1978 Actual	1979 Estimate
Washington	\$20,705	\$20,705
West Virginia	18,765	18,765
Wisconsin	43,317	43,317
Wyoming	8,862	8,862
4 percent - Federal administration	60,000	60,000
10 percent to finance work in 2 or more States	<u>b/</u>	150,000
	<hr/>	<hr/>
TOTAL	<u>1,500,000</u>	<u>1,500,000</u>

a/ No funding proposed in 1980.

b/ Regional research reflected in Iowa,  
Mississippi, New York, and Oregon.

Selected Examples of Recent Progress: Recent accomplishments for the programs of research are cited below:

## HATCH ACT

### Animal and Plant Production

#### Planned Grazing Improves Range Condition and Increases Steer Gains

Nebraska Agricultural Experiment Station scientists have been able to improve range condition and at the same time increase yearling steer gains by using a planned grazing system. The scientists divided the range into several pastures. Each pasture was systematically grazed for a certain period and then allowed to rest. Concentration of livestock on a given area forces the cattle to use plants that they previously would not have grazed. So both undesirable and desirable plants got used, and all plants throughout the pasture tended to get used equally. This led to better range condition. In addition, the system gave increased pounds of gain per acre by as much as 20 percent.

#### Soybean Research Effort Paying Off

An intensive soybean breeding research effort at Iowa State University has paid off in five new soybean varieties and three germ plasm lines released this year. Part of the thrust of this research is to expand the genetic diversity of soybeans so a disease outbreak won't turn into a major disaster. Two of the germ plasm lines have higher yield potential and partial resistance to brown stem rot--one of the most serious disease threats to soybeans in the Midwest. The other germ plasm line has superior resistance to iron-deficiency chlorosis, a problem associated with calcareous soils. The new varieties have some disease resistance and higher yields than those used now. The project was speeded up through a winter breeding program in Puerto Rico, where it is possible to grow up to four crops a year.

#### Smut Resistance Bred into Commercial Barley for First Time

For the first time, known sources of resistance to prevalent races of loose and covered smut have been combined in a commercially acceptable barley variety. This announcement of a variety called Glenn culminates over 25 years of cooperative research between the North Dakota Agricultural Experiment Station and the USDA, with supplemental funding from the barley processing industry. This is a major breakthrough for barley production in the United States.

#### Lowered Photorespiration Means Less Carbon Dioxide Loss for Plants

A way to cut plant carbon dioxide losses through photorespiration has been discovered by Connecticut Agricultural Experiment Station scientists in New Haven. Many plants--including such important crops as soybean, wheat, and rice--are inefficient producers of carbohydrates which are the basis for the plant's food. The reason for the inefficiency is that some of the carbon dioxide the plant produces via photosynthesis is lost through photorespiration. The Connecticut scientists have found four compounds that consistently limit glycolate synthesis (a key material in photorespiration) and so limit photorespiration. The decrease in the laboratory has been 60 percent, with a doubling of the net photosynthesis. The scientists are now looking for plant cells with lower photorespiration and higher net photosynthesis.



### Pasture Research Shows Way for Better Cattle Gains

Pasture research has been paying off for Missouri farmers. For example, a new fescue variety--Missouri 96--has been developed by Missouri Agricultural Experiment Station scientists. It consistently gives 35-40 percent higher daily cattle gains. Too, the scientists have found that a grass-legume mix is better for cattle gains, and cows' conception rates, than a fescue variety fertilized with nitrogen. They also have discovered some differences in fescue varieties as to how much they cause fescue foot disease problems in cattle. This latter discovery should lead to the breeding of varieties that are less toxic or completely nontoxic.

### Sorghum Is a Promising Forage for the Virgin Islands

Sorghum's ability to grow well with less water than corn is important to the Virgin Islands agriculture, where water is in short supply. A Virgin Islands Agricultural Experiment Station scientist has gotten crop yields up to 80 tons per acre. It also ratoons, which means multiple harvests from a single planting--thus saving land preparation, planting, and establishment time. New varieties yield 100 percent more than the old ones. This Virgin Islands sorghum research is generating interest in the crop's production in neighboring Caribbean Islands.

### Bacteria Increase Potato and Sugarbeet Yields

Bacteria which stimulate growth and yield of crops have been isolated and identified by California Agricultural Experiment Station plant pathologists. Potato yields were increased up to 30 percent and sugarbeet yields up to 10 percent when seeds were treated with the bacteria. There is a good chance that similar increases can be obtained with other crops such as wheat, where the treatment did well in greenhouse trials. Although they aren't sure, the scientists feel that the beneficial bacteria may stimulate plant growth by biologically controlling harmful organisms in the soil.

### Denser Planting Increases Soybean Yields

Soybean yield increases of 10-20 percent have resulted from research by Tennessee Agricultural Experiment Station scientists. The scientists reduced the spacing between soybean rows to about 20 inches. This creates a dense canopy of foliage. This closer planting allows the plants to intercept over 95 percent of the incoming radiant energy from the sun, and shades the soil and so cuts down on moisture loss through evaporation.

### Cooperative Research Aids Strawberry Production

Cooperative research efforts by food scientists, agricultural engineers, and horticulturists of the Arkansas Agricultural Experiment Station have resulted in a strawberry harvester that cuts the plants in a once-over operation, strips the berries off, and cleans out the major trash. The scientists also have developed a system to clean and sort berries into sizes and stages of ripeness. They also have developed a new strawberry--Cardinal--adapted to machine harvesting, and outyielding present standard varieties. Cardinal also has a much higher percentage of usable picked fruit.

### Economic and Engineering Studies Aid Pigeon Pea Production

Pigeon peas as an important crop and as another alternative for land use for farmers discontinuing sugarcane production has been the subject of study by Puerto Rican Agricultural Experiment Station scientists. Improved pigeon pea varieties and new technological practices developed by these scientists have cut production costs drastically. Yields have been increased three-fold over the Island average. Total production and farm value of the pigeon pea have increased significantly.

#### New Grape Holds Promise for Small Farm Production

Venus--the first table grape bred specifically for the soil and climate of Arkansas--has been released by Agricultural Experiment Station scientists in that State. It has real potential as a crop for small Arkansas farms. The fruit is seedless, blue-black, round, large, and has a tender skin and a pleasant flavor. The vines are moderately resistant to diseases found in the area, and their pest control needs fit in well with pesticide spraying schedules used on other crops.

#### New Soft Red Winter Wheat Available

A new high-yielding variety of soft red winter wheat has been developed at the Ohio Agricultural Research and Development Center. Named Titan, the new variety has consistently outyielded all currently recommended varieties. The new wheat has a good range of pest and disease resistance, and is satisfactory for milling and baking.

#### New Shorter Wheat Perfected for New York Conditions

A new wheat called "Houser" has been introduced by Cornell Agricultural Experiment Station scientists in New York State. Houser has long beards and a short stance. It is a superior yielder and mills and bakes well. These are important characteristics to New York growers who supply most of the country's pastry wheat. The variety's reduced height helps prevent crop losses due to wind and storm. And the new wheat's improved root system allows it to recover quickly from severe winters. It also resists two virulent wheat diseases--loose smut and powdery mildew.

#### Durum Wheat Breeding Pays Off

Since 1955, fifteen new durum wheat varieties have been made available to growers through one of the longest continuously funded research programs in the United States. The program is cooperative between the North Dakota Agricultural Experiment Station and the U. S. Department of Agriculture. In recent years, the North Dakota State Wheat Commission and the National Macaroni Manufacturers Association have provided supplemental funding. The benefit:cost ratio for durum wheat improvement work is 130:1. Estimates are that each new variety release, cumulative over the life of the release, is worth about \$24 million annually to growers and processors in yield, quality, and uniformity of product.

#### Discovery of Disease Resistance in Corn

Purdue (Indiana) Agricultural Experiment Station researchers have found that corn has a specific mechanism to resist disease. The resistance involves the production of chemical compounds called phenols. They inhibit growth of fungi and bacteria, and will inactivate viruses in plants. If these natural compounds can be manufactured, they might be used to immunize an entire crop against disease.

#### Remote Sensing Locates Cotton Root Rot Areas

The disease cotton root rot is particularly amenable to detection by infrared photography, Texas Agricultural Experiment Station scientists have discovered. Aerial remote sensing provides a superior means of locating areas affected by the disease. Soil samples can then be obtained and sodium applied to the infested areas of the fields after the crop has been harvested.

#### Livestock Stimulant Brings Gains with Low-Quality Feed

A growth stimulant that makes it possible to raise livestock on low-quality feed has been discovered by West Virginia Agricultural Experiment Station scientists.



This discovery will save tons of grain each year that are now used to feed livestock. Ruminants such as cows have microorganisms in their rumen that extract nitrogen from the cow's feed. Nitrogen is essential to body development. Thus, the more of these microorganisms there are, the more nitrogen that can be used from the feed, and the more growth for the cow. The researchers have discovered that acid-resistant hemicellulose (ARH) stimulates the growth of the microorganisms. Fortunately, ARH is found in low-quality grasses, sawdusts, corn stover, corn cobs, and other roughages.

#### Bicarbonate of Soda Increases Beef Calf Gains

Adding .75 percent bicarbonate of soda to beef calf high energy ration with 11 percent roughage per head daily increased steer calf gains by .22 pounds according to researchers at the Arizona Agricultural Experiment Station. The gain was apparently due to the calves eating 1.8 pounds per day more food when they got the bicarbonate of soda.

#### Cows and Calves Differ in Nutrient Requirements

It appears that cow-calf pasture systems should be arranged so that growing calves have exclusive access to the higher quality pastures available, according to research done at the Tennessee Agricultural Experiment Station. Beef cows, even when nursing calves, have lower nutritional requirements than do many other animals. Beef cows grazing high quality grass legume mixtures produce no more milk than cows grazing lower quality grass pastures. All the cows on the better pastures did was gain more weight which is of no value in brood animals. At the same time, calves that were allowed to wean on high quality pastures made greater weight gains. Thus, it is the calf that benefits from these pastures--not the cow.

#### Animal Wastes Can Profitably Be Fed to Beef Cattle

Cattle can be fed animal wastes profitably, according to research at the Virginia Agricultural Experiment Station. Such wastes have significant nutritive value. Broiler litter, for example, had a higher nutritive value than alfalfa hay. Feeding animal waste does not affect the quality or taste of beef steaks. Wastes can be made free of pathogens by processing. Also, there is no drug residue problem in the meat, given a 5-day withdrawal period before slaughter. Estimates of the amount of animal wastes in the United States is 2 billion tons annually--300 million tons, dry basis. Fifty percent is from concentrated operations, where it is easily collectible. The value of such wastes is from \$80 to \$100 per dry ton.

#### Crab Meat Proves to be a Valuable Protein Supplement for Swine

Alaska Agricultural Experiment Station scientists have been able to use waste crab meat--a byproduct of Alaska's fishing industry--as an effective protein supplement for swine. Snow (Tanner) and King crab meals were combined with barley produced in Alaska and corn produced in more southerly latitudes. The scientists were able to use the crab meal to replace up to 25 percent of protein which was commonly derived before from soybean meal in corn-soybean meal feed. In barley-soybean meal feed, crab meal can replace up to 50 percent of the soybean meal without reducing swine weight gains. These findings make it possible for Alaskan farmers to use crab meal that is available at a quarter to a third of the cost of soybean meal.

#### Alfalfa Cubes Better Than Baled Alfalfa Hay for Weaner Calves

Significantly increased gains, and feed required per pound of gain reduced by 24 percent, resulted from the feeding of alfalfa cubes rather than baled alfalfa hay to weaner calves in Wyoming. Agricultural Experiment Station scientists



there got these results which have real implications for Wyoming agriculture. The State produced 1,093,000 tons of alfalfa in 1976--more than any other western state. If all of the hay had been cubed instead of baled and fed to calves, 29,755 tons more beef would have been produced. Assuming that calves are worth 60 cents a pound, this would amount to \$35,706,000 additional income for Wyoming beef producers.

#### Differing Light Intensity Increases Milk Production

In varying the light that Holstein milk cows and growing heifers received, Michigan Agricultural Experiment Station scientists found they could increase milk production 10 percent and heifer growth 10 percent. What they did was give the animals 16 hours of light and 8 hours of dark per day--rather than 9 to 12 hours of light they usually would get during northern U. S. fall and winter periods. The increases were made with about the same quantity of feed normally consumed by the cattle. This technique could mean very significant profit increases for dairy and beef cattle operators.

#### Blood Typing Can Now Identify Swine Stress Susceptibility

Iowa Agricultural Experiment Station research has shown that swine can be tested for stress susceptibility by blood typing. Millions of dollars are lost each year when stress-susceptible pigs die during normal production practices. The same genetic abnormality occurs as malignant hypothermia in humans. The blood typing method also can pick out carrier pigs that have the recessive gene involved in the disease. Researchers have also used two other methods to predict which animals are stress-susceptible: creatine phosphokinase (CPK) levels (tested from a drop of blood on a small piece of special paper), and halothane gas administration which causes the muscles of stress-prone pigs to become rigid. This research will help to select those animals resistant to stress and prevent economic loss from the death of stress-prone pigs.

#### Control for Aflatoxicosis in Broilers

Aflatoxicosis in broilers can be alleviated by keeping environmental temperature as low as possible, by using antibiotic vitamin preparations in the drinking water, and by feeding aflatoxin-contaminated feed to older birds only, according to research at the Georgia Agricultural Experiment Station. Related aflatoxin research showed that aflatoxins have an immediate effect on the hatchability of eggs produced by a flock even before a decline in egg production becomes evident. These results will help poultry producers more efficiently use aflatoxin contaminated feeds.

#### Solar Heating and Cooling System Uses Soil and Groundwater

Purdue Agricultural Experiment Station researchers have been developing a solar energy system using soil and groundwater in a plastic-lined 20-foot by 64-foot field. A blower forces warmed air from the solar energy collector through plastic ducts 7 and 9 feet underground. Although energy transfer from air to soil and groundwater is less efficient than it would be from water, air is readily available at low cost, it requires no antifreeze, and it can be heated to a much higher temperature than water with the same energy. Heat stored during the day will be used to maintain greenhouse growing temperatures at night--saving regular fuel. The system is an alternative to using rocks or water tanks to store solar heat, and should be useful for rural homes and greenhouses.

#### Recycling Fly Ash onto Soils Works--Sometimes

Fly ash from coal-fired power plants presents a disposal problem. California Agricultural Experiment Station scientists have found that fly ash can be recycled onto soil, but with certain cautions. As little as 1 percent by weight

of the product can correct soil sulfur deficiencies. However, fly ash contains enough boron to damage sensitive crops if it is mixed with irrigated soils. When fly ash is used at rates greater than 4 percent by weight, forage crops absorb enough selenium and molybdenum to make them unsafe for consumption by ruminant animals.

#### Solar Heating and Thermal Insulation Work Well Together for Greenhouses

Pennsylvania Agricultural Experiment Station scientists have projected 20-year costs for insulation and solar heating for commercial flower grower greenhouses and found that solar heating and thermal insulation work well together. Initial solar heating costs, however, are too high right now compared to conventional steam or hot water heating in that State. As fuel costs increase, and solar system costs go down, this situation may change. As for insulation--a thin black polyethylene blanket on inside walls and over the ceilings reduced fuel needs by 40 percent. A heavier insulation board blanket pulled across the crop at night reduced fuel costs 60 percent.

#### Pest Control and Environmental Quality

##### Electrostatic Spraying Targets Pesticides

A University of Georgia Agricultural engineer has perfected the use of electrostatic force to improve the spread and "aim" of pesticide spraying. This cuts down the quantity of pesticide needed for proper pest control. In ordinary spraying--especially from the air--wind and drift of the light spray particles caused much spray material to miss the target area--and so there is a waste of money, energy, and spray. In this new process, an electrostatic force charges the small spray droplets negatively. This creates a strong attractive force between the pesticide and the grounded plants. The quantity of pesticide deposited on the target plants is greatly increased (up to sevenfold). Also, the pesticide is more uniformly "wrapped" around the target plant surface, and only half the recommended dosage of pesticide chemical need be used to give proper insect control.

##### Research Finds Ways to Control Grasshopper

A unique approach to insect population management has been developed by North Dakota Agricultural Experiment Station scientists. They are using a phagostimulant (to stimulate feeding) incorporated with an insecticide onto a shredded paper bait. Only the grasshoppers are involved--other beneficial non-chewing insects are not controlled. Since 1973, research has shown control to be up to 90 percent effective. This unique approach is ecologically and environmentally sound.

##### Research-Based Control of Mosquitoes

University of California mosquito control research has allowed control agencies to reduce their use of chemical insecticides almost 81 percent since 1962. Integrated control strategies growing out of research include use of natural enemies of mosquitoes such as gambusia fish and insect predators, manipulation of mosquito genetics to induce sterility and other characteristics, and the use of biological compounds to kill mosquitoes without harming non-target organisms. As a result of the application of this research, there are very low rates of mosquito-borne encephalitis and malaria infections in the State.

##### Fly Control with Common Dyes

Control of house fly larvae breeding in manure under caged layers can be controlled by spraying a dye solution on the manure weekly. Mississippi Agricultural Experiment Station scientists have gotten a 60-75 percent reduction

of fly larvae during a 4-week test by spraying Erythrosin B, a registered food additive safe for human consumption. This is the first reported success with the material in the field. This dye, and others under study, break down rapidly in the environment to non-toxic products. This development holds the promise of effective house fly control with negligible environmental insult.

### Marketing and Utilization

#### Stored Apples Need Calcium

Infusing Golden Delicious apples with calcium increases their storage and handling qualities greatly, according to Washington Agricultural Experiment Station research. The apples did not soften as quickly in storage, did not bruise as easily, and resisted development of bitter-pit. Estimates are that this process could add \$5 to \$7 million a year to the value of Washington's Golden Delicious crop.

#### Purified Enzyme Better for Corn Sugar Manufacture

Purdue (Indiana) Agricultural Experiment Station scientists have found that it pays to chemically purify an enzyme used in the manufacture of corn syrup. The enzyme glucose isomerase is important in the manufacture of high fructose corn syrup used widely in beverage manufacture and in baking. Purified, the enzyme remains more stable and keeps its effectiveness longer. Since the corn sugar industry is a high-volume business, even small savings in production costs become significant. More than a billion pounds of fructose-rich corn syrup are manufactured annually.

#### New, More Efficient Cheese Processing Method

A new technique that conserves virtually all of the protein and fat formerly lost in the whey in processed cheese manufacture has been developed by Utah Agricultural Experiment Station scientists. The process makes it possible from 100 pounds of milk to make more than 11 pounds of cheese instead of the 10 pounds possible before. The scientists applied an ultrafiltration procedure to whole milk, followed by fermentation and condensation. The result is a curd-like material that can be further processed into various cheeses. Commercial applications of the procedures should increase yield of processed cheeses by 18 percent.

#### Energy Savings Result from "Hot Boning" Beef Carcasses

Oklahoma Agricultural Experiment Station scientists have been able to make energy savings of at least 30 percent using a new beef processing method they have developed. Hot boning is a process of cutting carcasses into various retail pieces at the time of slaughter. Traditionally, carcasses have been hung for some time before being cut up. The new method calls for removing bone and excess fat at time of slaughter. Total storage space then needed is reduced by 70 to 80 percent; and the energy requirements to cool the meat properly is reduced by about 9400 btu's per animal.

### People, Housing, and Rural Development

#### Senior Citizens Suggest Meal Improvements

Suggestions such as adding some low calorie and low salt foods to the menu to make it easier for senior citizens to follow their special diets came out of research done by Vermont Agricultural Experiment Station scientists. The



senior citizens also said they would like to serve themselves and so get only the amount of food they wanted. They reported that the congregate meal program (Title VII) gave them an opportunity to eat and visit with friends. This was especially important for those who live alone. Also, by participating in the noon meal program, they did not have to cook and could save money on food. The meals are planned to provide one-third of the required nutrients for the day, and do make a significant contribution to the senior citizens' total daily dietary intake.

#### Land-Use Options Open to States

Iowa Agricultural Experiment Station studies of land use in the North Central Region show that regionally the supply of land is great enough so that states can exercise any one of several land-use options. In fact, the study found that preservation of all prime agriculture lands would cause somewhat lower farm prices and incomes. Given expected export demand levels, there is sufficient land to meet most urgent needs without great curtailment of food production uses, according to the study. The major concerns of land use are local: farmers resist encroachment of urban areas, water requirements, and higher taxes; residents who have built dwellings in the countryside complain of pollution by farm chemicals, livestock production, etc.

#### Increasing Food Iron Availability through Food Processing

Commercial food processors may be enhancing the nutritional value of starches and cereal grains just by the way they process food. Connecticut Agricultural Experiment Station scientists have found that heat and pressure processing techniques improve the nutritional value of ferrous sulfate, sodium iron pyrophosphate, and ferric pyrophosphate. These are common food additives used in commercial food preparation. The processing appears to increase the iron available from food so processed. This could be helping alleviate iron deficiency anemia--a major nutritional deficiency in humans in the United States and the world.

#### Landscape Planning Model Saves Natural Resource Values

Little or no significant loss or impairment to natural resource values even though a rural community increased its urban area 170 percent is one result of the application of a landscape planning model to three rural communities by Massachusetts Agricultural Experiment Station scientists. The model calls for landscape assessment to identify, locate, estimate resource quantity and quality, and produce computer maps showing environmental opportunities and constraints for various land use activities. Plan formulations then use information from the assessment phase to generate alternative land use plans. Evaluation procedures finally are used to estimate the potential effects of the alternative plans on natural resources, hazards, ecological values, and public service resources. The end result is that development planners have much better information on which to base their decisions.

#### Skim or Lowfat Milk May Not Be Good for Infants under 6 Months

Babies switched from formula or breast to low fat and skim milks often show a calorie deficiency according to a Massachusetts Agricultural Experiment Station study. Low fat formulas and milks are frequently used to prevent excessive weight gains in infants. If this results in calorie deficiency, as this research indicates, then this may be too high a price to pay for the possible prevention of obesity and atherosclerosis. The findings came from a longitudinal study of the growth and development and dietary intake of 92 female infants.

### Too Much Fiber in the Diet May Be Bad

Some fiber in the diet is needed, but too much of certain kinds can deplete the vitamin B<sub>12</sub> supply and cause a health hazard. This is one of the findings from research done at the University of California. Nutrition scientists there found that high levels of cellulose and pectin, found in fruits and vegetables, lead to progressively and significantly depressed growth and depletion of B<sub>12</sub> when fed to rats. Pectin apparently has an additional negative effect on use, because it serves as an energy source to intestinal bacteria. Consumption of pectin supplements would significantly increase the vitamin needs in the diet and could represent a health hazard to persons such as vegetarians and the elderly.

### MCINTIRE-STENNIS ACT

### Photographic Remote Sensing Identifies Urban Tree Stress

Aerial color infrared photos are as reliable as ground assessments in identifying tree stress in urban environments. This is according to researchers at the State University of New York, College of Environmental Science and Forestry. The researchers have found that optical density measurements can be used to detect and quantify tree stress systems. These procedures may well lead to early, quantitative, reliable, and cost-effective assessment of tree stress problems in the major cities of the nation. Such an assessment is needed before the problems can be combatted.

### New Uses for Lignin

Lignin is a major component of wood. It is discarded in many present papermaking processes. Virginia Agricultural Experiment Station researchers have developed a polyurethane foam from lignin recovered from spent pulping liquors. The foam can be used for insulation under many conditions. The researchers have also been working on ways of leaving the lignin in the wood, rather than extracting it during the pulp and papermaking process, and still not darkening the resulting paper. The researchers have developed ways to maintain the brightness while keeping the high yields of pulp with pulp containing lignin.

### Agricultural and Forest Residues for Adhesives

Phenolic resin adhesives are used for bonding wood products. University of Georgia research shows that agricultural and forest residues contain extractable chemicals that can reduce costs and improve performance of phenolic resin adhesives. This is done by extracting mixed natural phenols from wood bark, pine needles, and several agricultural residues to replace up to 60 percent or more of the standard petrochemical phenol. In several cases, faster resin cures also have been achieved. This research should lead to new and valuable residue use and lower costs for plywood and particleboard plants.

### Tissue Culture Techniques Aid Tree Growth

Using tissue culture techniques, University of Wisconsin-Madison scientists have been able to produce disease-free hybrid poplar trees. Getting rid of growth-slowing diseases this way has led to the hybrid poplars attaining almost double the growth of diseased parent hybrids. These findings could change the way Wisconsin's pulpwood producers grow their product.

### Poor Roads and Unnecessary Channel Disturbance Cause Most Watershed Sediments

Road location and unnecessary channel disturbance cause most of the movement of sediments from a forest watershed, according to a University of Georgia study.

The remedy is better road planning and field supervision of forest management operations. This is the first time that erosion under forest management has been related directly to causes. Clearcutting, roller-chopping and planting by machine produced little more sediment export than natural rate for an area. The researchers also found that nutrient exports resulting from clearcut silviculture were negligible, water yield was increased 25 centimeters per year, and water temperature increased 6 degrees Celcius in summer.

#### New Pulping Process Saves the Environment

A new pulping process developed by North Carolina Agricultural Experiment Station scientists reduces air and water pollution, reduces energy consumption, produces pulp of equal quality, and uses existing or slightly modified mill equipment. The process consists of pulping with soda to remove enough lignin so that wood fibers can be easily separated in a refiner. Then oxygen is injected into the pulp to remove the balance of the lignin. This gives a quality pulp without the environmental problems associated with conventional pulping.

### SPECIFIC RESEARCH GRANTS (Public Law 89-106)

#### Sludge Can Be a Source of Plant Nutrients

A Massachusetts Agricultural Experiment Station scientist has found that corn silage and tomato fruit yields from land fertilized with sewage sludge are comparable to those obtained with commercial fertilizers. There was no heavy metal accumulation in the edible portions of the plants. Pathogen survival in the soil, however, is still a problem.

#### New Methods Developed to Monitor Insect Populations

New Mexico Agricultural Experiment Station scientists have developed a way of "vacuuming up" insects via a field crop sampler. The insects collected this way are taken to a laboratory and sieved into size categories. Then they are vacuumed past an electronic sensor and their numbers automatically entered in a computer. Using this system, the scientists can project the future growth of specific insect populations in a given area. The new system is practical, fast, accurate, and relatively inexpensive. It will make it possible to more efficiently time pest control measures.

#### Root-Infesting Insects Decrease Soybean Yields

Insect damage to below-ground parts of the soybean causes substantial reductions in nitrogen fixation, plant growth and yield, according to research at Louisiana State University. Moderate injury to root nodules reduced the ability of soybean plants to fix atmospheric nitrogen by as much as 30 to 50 percent. Larvae of the bean leaf beetle and a platystomatid fly were found to attack nodules directly. Large yield increases were obtained in field experiments by controlling the nodule-infesting species. This knowledge could lead to a breakthrough in soybean yields, thus increasing the efficiency of land use and other inputs in production of this essential agricultural commodity.

#### Estrus Synchronization of Dairy Cattle

Research at Southern University on estrus synchronization of dairy heifers indicated that a synthetic progestin implanted simultaneously with an injection of estradiol valerate resulted in synchronization of estrus upon removal of the implanted synthetic progestin. There was no statistically significant difference in fertility between the treated and control animals. Significantly less time was required to inseminate the synchronized group. This can be very important in herds using artificial insemination of heifers. The time concentration for estrus detection would result in fewer missed cycles.





SCIENCE AND EDUCATION ADMINISTRATION  
EXTENSION

Purpose Statement

Cooperative agricultural extension work was established by the Smith-Lever Act of May 8, 1914, as amended. The legislation authorizes the Department of Agriculture to give, through the Land-Grant Colleges, instruction and practical demonstrations in agriculture and home economics and related subjects and to encourage the application of such information by means of demonstrations, publications, and otherwise to persons not attending or resident in the colleges. This work is further emphasized in Title XIV (National Agricultural Research, Extension and Teaching Policy) of the Food and Agriculture Act of 1977, more generally known as the Farm Bill.

The basic job of Cooperative Extension is to help people identify and solve their farm, home, and community problems through use of research findings of the Department of Agriculture and the State Land-Grant Colleges and programs administered by the Department of Agriculture. This work is carried out through State and county extension offices in each State, Puerto Rico, Guam, the Virgin Islands and the District of Columbia.

State and county extension work is financed from Federal, State, County, and local sources. These funds are used within the States for the employment of county agents, home economics agents, 4-H Club agents, State and area specialists, and others who conduct the joint educational programs adapted to local problems and conditions. There are approximately 16,000 State and County extension personnel employed throughout the States.

The Extension unit of the Science and Education Administration, USDA, as a partner in the cooperative effort, employs a national staff to coordinate the program by:

- Serving as liaison between the Department of Agriculture and the State extension services, providing program leadership and assistance to the states in the conduct of Extension work.
- Administering Federal laws authorizing Extension work and coordinating the work among the States.
- Providing leadership for the educational phases of all programs under the jurisdiction of the Department.

As of September 30, 1978 the Federal office had 177 employees of which 164 were permanent full-time.





SCIENCE AND EDUCATION ADMINISTRATION  
EXTENSION

Appropriation Act, 1979.....	\$275,399,000
Budget Estimate, 1980.....	259,227,000
Decrease in Appropriation.....	<u>\$-16,172,000</u>

SUMMARY OF INCREASES AND DECREASES  
(On basis of adjusted appropriation)

<u>Item of Change</u>	<u>1979 Estimated</u>	<u>Program Changes</u>	<u>1980 Estimated</u>
Smith-Lever:			
For Rural Development.....\$	1,000,000	\$ -1,000,000	\$ - -
For Pest Management.....	5,435,000	+1,000,000	6,435,000
For Farm Safety.....	1,020,000	-1,020,000	- -
For Urban Gardening.....	3,000,000	-3,000,000	- -
For Non-Point Source Pollution	- -	+1,300,000	1,300,000
For Energy Demonstration.....	- -	+ 300,000	300,000
Title V Rural Development.....	2,500,000	-2,500,000	- -
Minority Agriculture Education			
Grants .....	- -	+1,250,000	1,250,000
Food & Nutrition Education(EFNEP)	51,810,000	-1,250,000	50,560,000
Bankhead-Jones.....	11,500,000	-11,500,000	- -
Federal Admin. & Coordination...	6,543,000	+ 248,000	6,791,000
All Other.....	192,591,000	- -	192,591,000
TOTAL AVAILABLE.....	<u>\$275,399,000</u>	<u>-\$16,172,000<sup>a/</sup></u>	<u>\$259,227,000</u>

a/- Includes a total reduction of \$58,000 in travel costs as a part of the Department-wide management initiative to reduce travel costs. Includes a total increase of \$306,000 for pay increases effective in FY 1979 which were absorbed in FY 1979 but which are needed to carry out the programs proposed for FY 1980.

PROJECT STATEMENT

(On basis of adjusted appropriation)

Project	1978	1979 (estimated)	Increase or Decrease	1980 (estimated)
1. Payments to States:				
a. Smith-Lever Act:				
(1) Sections 3(b) & 3(c):				
(a) Program.....	139,596,656	144,091,680	- -	144,091,680
(b) Set-aside for Federal Administration (4%)....	3,309,320	3,461,320	- -	3,461,320
Total.....	142,905,976	147,553,000	- -	147,553,000
(c) Retirement and employ- ees' compensation costs	16,783,000	16,033,000	- -	16,033,000
(d) Penalty mail.....	16,245,000	16,245,000	- -	16,245,000
Subtotal, Sections 3(b) & 3(c).....	175,933,976	179,831,000	- -	179,831,000
(2) Section 3(d):				
(a) Rural development.....	1,000,000	1,000,000	- 1,000,000	- -
(b) Pest Management.....	4,433,100	5,435,000	+ 1,000,000	6,435,000
(c) Farm Safety.....	1,020,000	1,020,000	- 1,020,000	- -
(d) Pesticide Impact Assessment.....	735,000	1,735,000	- -	1,735,000
(e) Urban Gardening.....	3,000,000	3,000,000	- 3,000,000	- -
(f) Non-Point Source Pollution.....	- -	- -	+ 1,300,000	1,300,000
(g) Energy.....	- -	- -	+ 300,000	300,000
Subtotal, Section 3(d).....	10,188,100	12,190,000	- 2,420,000	9,770,000
Total, payments under the Smith-Lever Act.....	186,122,076	192,021,000	- 2,420,000(1)	189,601,000
b. Payments to the District of Columbia:				
(1) Program.....	825,600	873,600	- -	873,600
(2) Set-aside for Federal Administration(4%).....	36,400	36,400	- -	36,400
Total, payments to the District of Columbia.....	862,000	910,000	- -	910,000
c. Payments under Title V, Rural Development Act of 1972:				
(1) Program.....	2,400,000	2,400,000	- 2,400,000	- -
(2) Set-aside for Federal Administration(4%).....	80,000	100,000	- 100,000	- -
Total, Title V, Rural Development.....	2,480,000	2,500,000	- 2,500,000(2)	- -
d. Farmer-to-Consumer Direct Marketing Act of 1976:				
(1) Program.....	1,467,728	- -	- -	- -
(2) Set-aside for Federal Administration (4%).....	29,364	- -	- -	- -
Total, Farmer-to-Consumer direct marketing.....	1,497,092	- -	- -	- -
e. Payments to 1890 Colleges and Tuskegee Institute.....				
(1) Program.....	8,959,680	9,710,400	- -	9,710,400
(2) Set-aside for Federal Administration (4%).....	292,521	404,600	- -	404,600
Total, payments to 1890 Colleges and Tuskegee Institute:	9,252,201	10,115,000	- -	10,115,000

PROJECT STATEMENT

(On basis of adjusted appropriation)

Project	1978	1979 (estimated)	Increase or Decrease	1980 (estimated)
f. Food and Human Nutrition Education (EFNEP).....	50,560,000	51,810,000	- 1,250,000(3)	50,560,000
2. Aid to Land-Grant College (Bankhead-Jones Act).....	11,500,000	11,500,000	-11,500,000(4)	- -
3. Competitive Education Grants: (1890's and Tuskegee) .....	- -	- -	+1,250,000(5)	1,250,000
4. Federal Administration and Coordination (Direct Appropriation).....	5,588,433	6,543,000	+248,000(6)	6,791,000
Unobligated balance.....	1,195,870	- -	- -	- -
Total available or estimate.....	269,057,672	275,399,000	-16,172,000	259,227,000
Transfer to Office of Secretary..	+4,328	- -		
TOTAL, Appropriation.....	269,062,000	275,399,000		

Explanation of Program

Appropriations for the Extension unit of the Science and Education Administration enable the U.S. Department of Agriculture to perform its partnership role with its State and County counterparts to carry out cooperative agricultural extension work for the benefit of our Nation's farmers and ranchers, agricultural industries, rural and urban communities, families and youth, and the ultimate consumers.

Cooperative agricultural extension work is authorized under the Smith-Lever Act of 1914, as amended; the Rural Development Act of 1972, as amended; the Farmer-to-Consumer Direct Marketing Act of 1976; and the District of Columbia Public Postsecondary Education Reorganization Act. The National Agricultural Research, Extension and Teaching Policy Act of 1977 also authorizes the Federal Government, States and Counties to implement cooperative agriculture extension programs commensurate with needs stemming from changes in U.S. agricultural practices and the world food and agricultural situation.

Through these basic legislative authorities, a variety of programs broadly identified under the following major thrusts are conducted by the Cooperative Extension Services in each State, Puerto Rico, Guam, the Virgin Islands, and the District of Columbia:

- Agriculture and Natural Resources -- This program serves as the primary delivery system of agricultural research in all counties and agricultural communities throughout the States. Approximately 6,833 staff-years or 41% of Extension's professional staff-time is in support of this program which emphasizes the attainment of highly efficient systems of production, processing and marketing of food and fiber by commercial farmers, small and limited resource farmers, and others engaged in agriculture.
- Community Resource Development -- This program helps local officials and community leaders to more clearly identify their specific needs and resources, better understand possible solutions, formulate action plans, and carry out their decisions. Through Extension assistance, local leaders and officials have been better able to utilize current research and technology, broaden citizen participation in the decision making process, and quickly determine what federal assistance is available to them. Approximately 1,333 staff-years or 8% of Extension professional staff-time is in support of this program which includes assistance in manpower development, community services and facilities and other community development programs.



- Home Economics -- This program is directed to families and individuals at all levels of society to help them achieve their goals of improved home and family living. Approximately 3,767 staff-years or 22.6% of Extension professional staff-time is in support of this program which includes assistance in food and nutrition, clothing and textiles and the expanded nutrition education programs in the low-income areas.
- 4-H Youth -- This program is designed to help youth from all racial, ethnic, and socioeconomic backgrounds develop life skills through participation in 4-H Clubs, 4-H special interest groups, instructional 4-H T.V. series, and special 4-H nutritional education programs. Approximately 4,734 staff-years or 28.4% of Extension professional staff-time is in support of this program.

JUSTIFICATION OF INCREASES AND DECREASES

- (1) A net decrease of \$2,420,000 for payments to States for Cooperative Agricultural Extension work consisting of:

- (a) A decrease of \$5,020,000 in payments to States authorized under section 3(d) of the Smith-Lever Act to eliminate the following programs: rural development (\$1.0 million); farm safety (\$1.02 million); and urban gardening (\$3.0 million).

Need for Change. This proposal eliminates these earmarked programs in FY 1980 which are currently being funded under section 3(d) of the Smith-Lever Act. Similar extension activities are being carried out by the State Extension Services from funds available to them under the formula provisions (section 3(b) and (c) of the Smith-Lever Act, and from other State and county extension appropriations. At their discretion, State Extension Services may continue to provide additional assistance in these areas by realigning their allocations of available resources.

Nature of Change. This change would eliminate direct federal support for these programs. States could continue these programs by using formula funds if they desire to do so.

- (b) An increase of \$1,000,000 in payments to States authorized under section 3(d) of the Smith-Lever Act to expand current programs in Integrated Pest Management (IPM) (\$5,435,000 available in 1979).

Need for Change. The State Cooperative Extension Services have established the benefits of IPM via pilot demonstration projects in most States. In 1979 the program was expanded and/or initiated in all States for major agricultural commodities. The long-term objective is a stepwise expansion of the educational program so that after ten years the IPM program will reach about two-thirds of the cultivated crops and livestock and poultry. This educational program can reduce use of pesticides, stabilize agricultural production efficiency, increase net profits to farmers, and reduce environmental hazards from pesticides. With increased information and technical assistance, producers will be able to purchase IPM advisory services from private consultants and IPM farmer-operated cooperatives from savings in pesticide purchases. Some continuing Extension activity will be required to provide the necessary education to assure that improved IPM technologies are demonstrated and accepted by farmers, ranchers, and homeowners. Small and limited-resource farmers and gardeners have more difficulty adopting and securing IPM practices and services; therefore specialized educational materials and demonstrations are needed for these groups.

Nature of Change. Funds will be allocated to the States to expand on-going IPM educational programs by increasing interdisciplinary coverage for pests that limit crop and livestock production and getting more producers involved in IPM programs offered by private consultants and grower-operated organizations that provide for monitoring of pest populations, assessment and predicting damage from pests, and decisions on alternative choices of appropriate pest control methods. New educational materials and demonstrations for small and limited resource farmers will also be developed.

- (c) An increase of \$1,300,000 in payments to States authorized under section 3(d) of the Smith-Lever Act for nonpoint source pollution (no funds provided under section 3(d) of the Act in 1979).

Need for Change. National water quality strategy places high priority on improved control of nonpoint source pollution, especially that from agricultural practices.

Present EPA and USDA administrative policy calls for voluntary, non-regulatory programs for improved management of agricultural nonpoint pollution sources. Effective voluntary programs require extension support. This support is increasingly requested by other local, State and Federal agencies charged with agricultural nonpoint pollution management responsibilities.

Effective and efficient management of toxic substances, wastes and excess nutrients from agricultural and municipal sources, protection of our lands from excess erosion, and surface waters from polluting run-off and sedimentation are critical problems. Increasing amounts of "best management practices" are needed on crops, range, and forest lands to minimize the resulting nonpoint source pollution. These improved practices will embrace the adaptation and utilization of the most effective types of soil tillage, improved management of plant nutrients, herbicides, pesticides, ground tile drainage and sediment basins, irrigation water, together with more efficient utilization of crop and harvesting wastes, animal manure and sewage sludges and effluents. With increasing nonpoint pollution control in agricultural areas, Extension needs to expand its educational programs for managing soil, water, and range resources, and improving methods for recycling wastes and reducing pollution and degradation of water, air and soil resources utilized for farming, forestry, grazing, and non-agricultural purposes.

Nature of Change. These funds will be used to expand assistance in area and state nonpoint pollution control planning and in providing assistance to private landowners. Farmers will be encouraged to adopt "best management practices" for controlling or preventing nonpoint source pollutants from croplands, rangelands, and forests and the subsequent degradation of streams, lakes, and underground water resources. These programs will help meet the objectives of Section 208 of P.L. 92-500, the Clean Water Act of 1977, the Safe Drinking Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, and the Toxic Substances Control Act.

- (d) An increase of \$300,000 in payments to States authorized under section 3(d) of the Smith-Lever Act for solar energy demonstrations (no funds provided under section 3(d) of the Act in 1979).

Need for Change. The pressure of limited petroleum supplies, increasing prices, and economic and security problems arising from petroleum imports require that each sector of the economy seek ways to reduce demand for petroleum. The development of applications of solar, wind and biomass energy and the transfer of knowledge and use of those proven practical to operating farms and rural people affords alternatives for reducing this demand. Extension solar energy programs are needed to demonstrate the use of presently available applications as well as the feasibility of using new applications as they are developed.



Nature of Change. Funds will provide Extension support of two regional solar energy research and development centers and assistance in conducting demonstration projects of solar energy use on operating farms. Agricultural applications of solar and wind energy, such as crop drying, irrigation pumping, and heating of greenhouses, livestock shelters, and rural residences will be demonstrated. Priority will be on multiple use of systems, use of biomass as the back-up to solar and wind systems and economic feasibility. Work will be geared at each regional solar energy research and development center to provide extension inputs into development of research, provide a linkage between research centers and State Extension Services, develop popular publications and teaching materials, and assist in the establishment of solar energy demonstrations.

Training will be conducted for state and county staffs at these regional solar energy research and development centers. Contracts will be made with the regional Agricultural Engineering Services to work with State extension services to provide assistance to farmers and farm families in the application of research results from the regional solar energy research and development centers.

- (2) A decrease in payments to States authorized under Title V of the Rural Development Act of 1972 (\$2.5 million).

Need for Change. This proposal eliminates the earmarked program in FY 1980 which is currently being funded under Title V of the Rural Development Act of 1972. As in the case with items noted above, similar extension activities are being carried out by the State Extension Services from funds available to them under the formula provisions (section 3(b) and (c)) of the Smith-Lever Act, and from other State and county extension appropriations. At their discretion, State Extension Services may continue to provide additional assistance in these areas by realigning their allocations of available resources. In addition, legislative authorization covering Federal grants under the Title V of the Rural Development Act of 1972 expires on September 30, 1979.

Nature of Change. This change would eliminate direct federal support for these programs. States could continue these programs by using formula funds if they desire to do so.

- (3) A decrease of \$1,250,000 for food and human nutrition education program (\$51,810,000 available in 1979).

Need for Change. The \$1,250,000 decrease proposed would restore this program to the pre-1979 level of \$50,560,000 in funding under this line item. In addition, for FY 1980, the Food and Nutrition Service will provide \$2,000,000 to SEA - Extension to initiate pilot EFNEP projects which will incorporate Food Stamp outreach with the ongoing EFNEP program. Alternative methods for carrying out the EFNEP program will also be studied. One of these alternatives to be examined is the acceleration and concentration of the program provided to an enrollee and the shortening of the enrollment period. If this approach proves to be effective, more families could then be reached with the same funding level currently being used. With the FNS transfer, the EFNEP program level even with the direct funding decrease, will actually be increased by \$750,000. Studies mentioned above should provide the basis for determining future resource needs for the EFNEP program.

Nature of Change. Direct funding under this line item for EFNEP will be decreased by \$1,250,000. However, the overall program level will be increased by \$750,000 due to a \$2,000,000 program funded in the FNS for pilot projects incorporating Food Stamp outreach.

- (4) A decrease of \$11,500,000 in payments to States authorized under section 22 of the Bankhead-Jones Act. (\$11,500,000 available in 1979).

Need for Change. Section 1417 (c) of the Food and Agriculture Act of 1977 authorized the transfer of these funds in FY-78 from HEW to the Department of Agriculture for administration. Under the broad and permissive language of section 22, Bankhead-Jones Act to provide funds to the land-grant colleges "for support of agriculture, the mechanic arts and related fields" approximately 82% of these funds have been used to support educational programs in english, economics, chemistry, and biology. Therefore, most of the funds do not go for direct support of agricultural education. Because of the relative insignificance of these funds, approximately \$200,000 per state, compared to the total provided the land-grant institutions by state appropriations, the Department is proposing to eliminate the distribution of funds under this authorization. These funds would be used to support other high priority programs of the Department.

Nature of Change. The program will be terminated.

- (5) An increase of \$1,250,000 to support educational development in food and agricultural sciences at the 1890 Land-Grant Colleges and Tuskegee Institute: (No funds available in FY 1979).

Need for Change. The 1890 Land-Grant Colleges and universities and Tuskegee Institute have been primarily involved with under-graduate agricultural programs until recent years when they have received increased funding for research and extension. While the educational programs at these institutions have been in existence for a long period of time, they need massive professional assistance if they are to respond adequately to demands imposed upon a modern college of agriculture. A very large proportion of minority college graduates come from the 1890 colleges and this will, in all probability, hold true into the foreseeable future. In view of the extreme shortage of minority professionals in food and agricultural sciences it would seem imperative that an effort be made to strengthen the institutions with predominantly minority enrollees. Funds which could be used to support cooperative projects to enhance faculty exchange and/or development, student recruitment, student retention, curriculum development, research coordination, and public service activities would benefit the entire academic community of food and agriculture.

Nature of Change. Funds will be available to all colleges and universities on a competitive grant basis. The thrust of the effort would be to support educational development in the 1890 land-grant colleges and universities through cooperative agreements with colleges which have more comprehensive educational programs in food and agricultural sciences.

Grant proposals will be accepted from (1) any institution which has the interest, staff, and specific expertise to help accelerate educational development in predominantly minority colleges and universities; (2) combinations of minority colleges and universities which can identify a common need and one which can be alleviated through group action.

- (6) A net increase of \$248,000 for Federal Administration and Coordination (direct appropriation) (\$6,785,000 available in 1979) consisting of:

(a) A decrease of \$58,000 for reduced travel.

(b) An increase of \$306,000 for FY 1979 pay increases.

PAYMENTS TO STATES, PUERTO RICO, GUAM, AND THE VIRGIN ISLANDS

Federal funds available for fiscal year 1979 under the appropriation "Payments to States" for cooperative agricultural extension work under the Smith-Lever Act, the D. C. Public Postsecondary Education Reorganization Act, the Rural Development Act of 1972, and the Farmer-to-Consumer Direct Marketing Act of 1976 total \$257,356,000. In addition, \$11,500,000 was appropriated under section 22, Bankhead-Jones Act for support of instruction in agriculture, the mechanic arts, and related fields at the Land-Grant colleges.

Amounts appropriated are made available to States, Puerto Rico, Guam and the Virgin Islands by letter of credit. Funds are disbursed in accordance with budgets and plans of work submitted by the States and approved by SEA-Extension on behalf of the Secretary of Agriculture. As reflected in Table III, about 40 percent of the cost of Extension work at present is being financed from Federal sources and about 60 percent from State and local sources.

The funds are used by the States for the employment of Extension workers to carry on cooperative agricultural extension work. Paid Extension workers are assisted by volunteer leaders who cooperate in carrying out Extension programs.

The use of these funds is indicated in greater detail in the following tables: Table I reflects estimated allotments to States, Puerto Rico, Guam, and the Virgin Islands under the formula provisions of Section 3(b) and 3(c) of the Smith Lever Act. Supplementary Tables 1A, 1B, 1C, 1D, 1E, and 1F reflect the estimated allotments for rural development and pesticide impact assessment under Section 3(d) (Non-formula) of the Act, payments for rural development extension education under the Rural Development Act, Title V, payments to the 1890 Land-Grant Colleges and Tuskegee Institute, payments for food and human nutrition education (EFNEP), and payments under Section 22 of the Bankhead-Jones Act. Table II shows the basis on which the allotments will be made and the extent to which they must be matched by the State and local sources. Table III indicates the sources of funds allotted for Cooperative Extension work in the States, Puerto Rico, Guam, and the Virgin Islands for fiscal year 1979. Table IV indicates the various classes of field agents employed with Extension funds.



Table 1

APPROPRIATIONS FOR PAYMENTS TO STATES, STATE ALLOTMENTS, FY 1979 - 1980

Smith-Lever Act: Sections 3(b) and 3(c)	FY-1979	Inc. or Dec. FY 1980	Total Proposed for FY 1980
Alabama	\$ 4,067,940	\$ --	\$ 4,067,940
Alaska	505,380	--	505,380
Arizona	924,654	--	924,654
Arkansas	3,354,883	--	3,354,883
California	3,791,726	--	3,791,726
Colorado	1,463,944	--	1,463,944
Connecticut	1,085,957	--	1,085,957
Delaware	605,485	--	605,485
Florida	2,118,805	--	2,118,805
Georgia	4,416,634	--	4,416,634
Guam	463,055	--	463,055
Hawaii	701,347	--	701,347
Idaho	1,278,668	--	1,278,668
Illinois	4,862,563	--	4,862,563
Indiana	4,298,157	--	4,298,157
Iowa	4,552,464	--	4,552,464
Kansas	2,753,967	--	2,753,967
Kentucky	4,809,331	--	4,809,331
Louisiana	2,933,060	--	2,933,060
Maine	1,113,914	--	1,113,914
Maryland	1,691,280	--	1,691,280
Massachusetts	1,379,440	--	1,379,440
Michigan	4,447,724	--	4,447,724
Minnesota	4,302,988	--	4,302,988
Mississippi	4,282,498	--	4,282,498
Missouri	4,385,818	--	4,385,818
Montana	1,211,968	--	1,211,968
Nebraska	2,448,183	--	2,448,183
Nevada	510,831	--	510,831
New Hampshire	750,318	--	750,318
New Jersey	1,351,526	--	1,351,526
New Mexico	1,020,247	--	1,020,247
New York	4,261,397	--	4,261,397
North Carolina	6,559,763	--	6,559,763
North Dakota	1,715,395	--	1,715,395
Ohio	5,379,581	--	5,379,581
Oklahoma	2,919,843	--	2,919,843
Oregon	1,702,331	--	1,702,331
Pennsylvania	5,324,588	--	5,324,588
Puerto Rico	4,375,940	--	4,375,940
Rhode Island	515,725	--	515,725
South Carolina	3,296,712	--	3,296,712
South Dakota	1,752,469	--	1,752,469
Tennessee	4,759,545	--	4,759,545
Texas	6,637,573	--	6,637,573
Utah	822,579	--	822,579
Vermont	859,467	--	859,467
Virginia	3,949,941	--	3,949,941
Virgin Islands	447,819	--	447,819
Washington	2,042,341	--	2,042,341
West Virginia	2,316,863	--	2,316,863
Wisconsin	4,299,825	--	4,299,825
Wyoming	722,319	--	722,319
Subtotal	\$142,546,771	--	\$142,546,771
Special Needs, Sec. 3(b), Smith-Lever Act	1,544,909	--	1,544,909
Retirement and Employees' Compensation Costs	16,033,000	--	16,033,000
Penalty Mail Costs (Extension Agents & Directors)	16,245,000	--	16,245,000
Fed. Admin. & Coord., Sec. 3(c)1, Smith-Lever Act	3,461,320	--	3,461,320
Funds for Allocation, Sec. 3(d), Smith-Lever Act:			
Rural Development	1,000,000	-1,000,000	--
Pest Management	5,435,000	+1,000,000	6,435,000
Farm Safety	1,020,000	-1,020,000	--
Pesticide Impact Assessment	1,735,000	--	1,735,000
Urban Gardening	3,000,000	-3,000,000	--
Non-point Source Pollution	--	+1,300,000	1,300,000
Energy	--	+ 300,000	300,000
Sec. 1425, P.L. 95-113, Nutrition Ed. Program	51,810,000	-1,250,000	50,560,000
Sec. 1444, P.L. 95-113, 1890 Program	10,115,000	--	10,115,000
Sec. 1417, P.L. 95-113, Competitive			
Education Grants	--	+1,250,000	1,250,000
D.C. Act, including Fed. Administration	910,000	--	910,000
Title V, Rural Development Act	2,500,000	-2,500,000	--
Sec. 22, Bankhead-Jones Act	11,500,000	-11,500,000	--
TOTAL	\$263,856,000	\$-16,420,000	\$252,436,000

Table 1A

APPROPRIATIONS FOR PAYMENTS TO STATES  
RURAL DEVELOPMENT, FY 1979 - 1980

Smith-Lever Act: Section 3(d)	Fiscal Year 1979	Increase or Decrease Fiscal Year 1980	Total Proposed for FY 1980
Alabama	\$ 24,636	\$- 24,636	--
Alaska	4,904	- 4,904	--
Arizona	7,626	- 7,626	--
Arkansas	19,435	- 19,435	--
California	25,470	- 25,470	--
Colorado	10,516	- 10,516	--
Connecticut	9,219	- 9,219	--
Delaware	5,369	- 5,369	--
Florida	15,832	- 15,832	--
Georgia	27,472	- 27,472	--
Hawaii	4,966	- 4,966	--
Idaho	9,632	- 9,632	--
Illinois	32,109	- 32,109	--
Indiana	29,584	- 29,584	--
Iowa	30,073	- 30,073	--
Kansas	17,733	- 17,733	--
Kentucky	29,264	- 29,264	--
Louisiana	18,679	- 18,679	--
Maine	8,470	- 8,470	--
Maryland	13,141	- 13,141	--
Massachusetts	10,856	- 10,856	--
Michigan	31,869	- 31,869	--
Minnesota	28,543	- 28,543	--
Mississippi	27,006	- 27,006	--
Missouri	28,127	- 28,127	--
Montana	8,875	- 8,875	--
Nebraska	16,083	- 16,083	--
Nevada	4,689	- 4,689	--
New Hampshire	6,511	- 6,511	--
New Jersey	10,698	- 10,698	--
New Mexico	7,482	- 7,482	--
New York	30,909	- 30,909	--
North Carolina	45,108	- 45,108	--
North Dakota	11,686	- 11,686	--
Ohio	36,119	- 36,119	--
Oklahoma	16,472	- 16,472	--
Oregon	12,305	- 12,305	--
Pennsylvania	36,857	- 36,857	--
Puerto Rico	32,799	- 32,799	--
Rhode Island	4,726	- 4,726	--
South Carolina	22,724	- 22,724	--
South Dakota	11,892	- 11,892	--
Tennessee	30,899	- 30,899	--
Texas	38,396	- 38,396	--
Utah	6,387	- 6,387	--
Vermont	7,187	- 7,187	--
Virginia	26,447	- 26,447	--
Washington	14,681	- 14,681	--
West Virginia	14,461	- 14,461	--
Wisconsin	29,233	- 29,233	--
Wyoming	5,843	- 5,843	--
Special Projects	40,000	- 40,000	--
TOTAL	\$1,000,000	\$-1,000,000	--

Table 1B

APPROPRIATIONS FOR PAYMENTS TO STATES  
PESTICIDE IMPACT ASSESSMENT, FY 1979 - 1980

Smith-Lever: Sec. 3(d) :	Fiscal Year 1979	Increase or Decrease Fiscal Year 1980	Total Proposed for FY 1980
Alabama	\$ 25,790	--	\$ 25,790
Alaska	8,536	--	8,536
Arizona	18,903	--	18,903
Arkansas	40,681	--	40,681
California	89,780	--	89,780
Colorado	19,988	--	19,988
Connecticut	11,446	--	11,446
Delaware	11,212	--	11,212
Florida	36,490	--	36,490
Georgia	57,372	--	57,372
Guam	8,676	--	8,676
Hawaii	11,470	--	11,470
Idaho	19,765	--	19,765
Illinois	81,241	--	81,241
Indiana	41,864	--	41,864
Iowa	77,978	--	77,978
Kansas	34,802	--	34,802
Kentucky	22,237	--	22,237
Louisiana	24,524	--	24,524
Maine	14,090	--	14,090
Maryland	17,291	--	17,291
Massachusetts	14,917	--	14,917
Michigan	34,126	--	34,126
Minnesota	52,413	--	52,413
Mississippi	40,957	--	40,957
Missouri	37,577	--	37,577
Montana	17,197	--	17,197
Nebraska	52,125	--	52,125
Nevada	9,904	--	9,904
New Hampshire	9,697	--	9,697
New Jersey	15,424	--	15,424
New Mexico	12,202	--	12,202
New York	30,943	--	30,943
North Carolina	46,672	--	46,672
North Dakota	21,578	--	21,578
Ohio	42,629	--	42,629
Oklahoma	28,165	--	28,165
Oregon	21,398	--	21,398
Pennsylvania	25,770	--	25,770
Puerto Rico	8,567	--	8,567
Rhode Island	10,622	--	10,622
South Carolina	27,007	--	27,007
South Dakota	20,486	--	20,486
Tennessee	24,163	--	24,163
Texas	79,544	--	79,544
Utah	11,844	--	11,844
Vermont	10,394	--	10,394
Virginia	24,824	--	24,824
Virgin Islands	8,567	--	8,567
Washington	27,789	--	27,789
West Virginia	11,723	--	11,723
Wisconsin	35,610	--	35,610
Wyoming	11,030	--	11,030
Special Projects	235,000	--	235,000
TOTAL	\$1,735,000	--	\$1,735,000



Table 1C

APPROPRIATIONS FOR PAYMENTS TO STATES  
TITLE V of RURAL DEVELOPMENT ACT of 1972  
FY 1979 - 1980

	Fiscal Year 1979	Increase or Decrease Fiscal Year 1980	Total Proposed for FY 1980
Alabama	\$ 46,580	\$- 46,580	--
Alaska	12,233	- 12,233	--
Arizona	17,463	- 17,463	--
Arkansas	40,882	- 40,882	--
California	54,770	- 54,770	--
Colorado	25,153	- 25,153	--
Connecticut	21,533	- 21,533	--
Delaware	13,180	- 13,180	--
Florida	36,542	- 36,542	--
Georgia	53,558	- 53,558	--
Hawaii	12,320	- 12,320	--
Idaho	23,691	- 23,691	--
Illinois	79,148	- 79,148	--
Indiana	73,022	- 73,022	--
Iowa	77,027	- 77,027	--
Kansas	44,032	- 44,032	--
Kentucky	69,400	- 69,400	--
Louisiana	39,228	- 39,228	--
Maine	19,308	- 19,308	--
Maryland	29,539	- 29,539	--
Massachusetts	24,785	- 24,785	--
Michigan	71,212	- 71,212	--
Minnesota	72,527	- 72,527	--
Mississippi	48,410	- 48,410	--
Missouri	65,219	- 65,219	--
Montana	22,530	- 22,530	--
Nebraska	41,172	- 41,172	--
Nevada	11,944	- 11,944	--
New Hampshire	15,497	- 15,497	--
New Jersey	24,830	- 24,830	--
New Mexico	18,003	- 18,003	--
New York	67,562	- 67,562	--
North Carolina	87,655	- 87,655	--
North Dakota	29,561	- 29,561	--
Ohio	84,738	- 84,738	--
Oklahoma	38,893	- 38,893	--
Oregon	29,925	- 29,925	--
Pennsylvania	81,826	- 81,826	--
Puerto Rico	57,042	- 57,042	--
Rhode Island	11,865	- 11,865	--
South Carolina	40,861	- 40,861	--
South Dakota	30,933	- 30,933	--
Tennessee	64,437	- 64,437	--
Texas	80,942	- 80,942	--
Utah	15,440	- 15,440	--
Vermont	16,857	- 16,857	--
Virginia	53,977	- 53,977	--
Washington	34,508	- 34,508	--
West Virginia	31,275	- 31,275	--
Wisconsin	72,195	- 72,195	--
Wyoming	14,770	- 14,770	--
4%--Federal Admin.	100,000	- 100,000	--
10% to finance work in two or more States	250,000	- 250,000	--
TOTAL	\$2,500,000	\$-2,500,000	--

Table 1D

APPROPRIATIONS FOR PAYMENTS TO THE 1890 LAND-GRANT COLLEGES  
AND TUSKEGEE INSTITUTE, FY 1979 - 1980

Food & Agriculture Act: Sec. 1444	Fiscal Year 1979	Inc. or Dec. FY 1980	Proposed for FY 1980
ALABAMA:			
Alabama A&M University	\$ 548,455	--	\$ 548,455
Tuskegee Institute	548,455	--	548,455
ARKANSAS:			
Univ. of Arkansas at Pine Bluff	473,552	--	473,552
DELAWARE:			
Delaware State College	189,296	--	189,296
FLORIDA:			
Florida A&M University	418,322	--	418,322
GEORGIA:			
Fort Valley State College	614,624	--	614,624
KENTUCKY:			
Kentucky State University	733,022	--	733,022
LOUISIANA:			
Southern Univ. and A&M College	456,828	--	456,828
MARYLAND:			
Univ. of Maryland Eastern Shore	353,021	--	353,021
MISSISSIPPI:			
Alcorn State University	577,859	--	577,859
MISSOURI:			
Lincoln University	697,402	--	697,402
NORTH CAROLINA:			
North Carolina A&T State Univ.	966,988	--	966,988
OKLAHOMA:			
Langston University	439,214	--	439,214
SOUTH CAROLINA:			
South Carolina State College	496,726	--	496,726
TENNESSEE:			
Tennessee State University	711,880	--	711,880
TEXAS:			
Prairie View A&M University	874,536	--	874,536
VIRGINIA:			
Virginia State College	610,220	--	610,220
Federal Adm.	404,600	--	404,600
TOTAL	\$10,115,000	--	\$10,115,000

Table 1E

APPROPRIATIONS FOR PAYMENTS TO STATES  
FOOD and HUMAN NUTRITION EDUCATION FY-79-80

Food & Agricultural Act:Sec 1425	Fiscal Year 1979	Increase or Decrease Fiscal Year 1980	Total Proposed For FY 1980 (est.) <sup>1/</sup>
Alabama	\$ 1,727,752	\$- 296,904	1,430,848
Alaska	148,441	- 87,769	60,672
Arizona	475,969	- 5,761	470,208
Arkansas	1,100,398	- 220,654	879,744
California	2,734,072	+1,179,272	3,913,344
Colorado	471,306	+ 3,958	475,264
Connecticut	382,936	- 3,736	379,200
Delaware	190,294	- 84,118	106,176
District of Columbia	- -	+ 212,352	212,352
Florida	1,732,201	+ 199,191	1,931,392
Georgia	1,880,502	- 303,030	1,577,472
Hawaii	222,597	- 91,141	131,456
Idaho	250,799	- 73,839	176,960
Illinois	1,819,671	+ 137,001	1,956,672
Indiana	1,044,668	- 124,476	920,192
Iowa	792,083	- 195,475	596,608
Kansas	599,279	- 83,567	515,712
Kentucky	1,449,328	- 240,944	1,208,384
Louisiana	1,612,366	- 75,342	1,537,024
Maine	366,135	- 108,279	257,856
Maryland	721,865	- 24,137	697,728
Massachusetts	825,462	+ 59,338	884,800
Michigan	1,539,722	- 83,594	1,456,128
Minnesota	863,377	- 130,257	733,120
Mississippi	1,492,193	- 278,753	1,213,440
Missouri	1,347,419	- 144,091	1,203,328
Montana	255,350	- 83,446	171,904
Nebraska	468,381	- 119,517	348,864
Nevada	144,228	- 63,332	80,896
New Hampshire	204,170	- 77,770	126,400
New Jersey	902,205	+ 149,443	1,051,648
New Mexico	433,553	- 44,241	389,312
New York	2,864,060	+ 710,532	3,574,592
North Carolina	2,220,044	- 495,948	1,724,096
North Dakota	300,854	- 128,950	171,904
Ohio	1,889,665	- 18,945	1,870,720
Oklahoma	907,031	- 82,903	824,128
Oregon	415,689	+ 9,015	424,704
Pennsylvania	2,329,265	- 64,177	2,265,088
Puerto Rico	1,043,776	+1,484,224	2,528,000
Rhode Island	260,238	- 83,278	176,960
South Carolina	1,339,830	- 333,686	1,006,144
South Dakota	338,402	- 120,994	217,408
Tennessee	1,726,965	- 291,061	1,435,904
Texas	3,621,789	- 26,973	3,594,816
Utah	260,913	- 38,449	222,464
Vermont	203,741	- 107,677	96,064
Virginia	1,475,505	- 251,953	1,223,552
Washington	574,340	+ 32,380	606,720
West Virginia	853,602	- 201,378	652,224
Wisconsin	823,344	- 44,720	778,624
Wyoming	162,225	- 91,441	70,784
Guam	- -	- -	- -
Virgin Islands	- -	- -	- -
TOTAL	51,810,000	(-)1,250,000	50,560,000

<sup>1/</sup> Requested and distributed under section 1425 of the Food and Agriculture Act of 1977 (P.L. 95-113). Distribution by State is an estimate at this time because of a lack of population data (poverty) from Guam and the Virgin Islands.



Table 1F

APPROPRIATIONS FOR PAYMENTS TO STATES  
UNDER SECTION 22, BANKHEAD-JONES ACT FY 1979 - 1980

	Fiscal Year 1979	Increase or Decrease Fiscal Year 1980	Total Proposed for FY 1980
Alabama	\$ 206,833	\$- 206,833	--
Alaska	154,986	- 154,986	--
Arizona	179,248	- 179,248	--
Arkansas	181,737	- 181,737	--
California	479,252	- 479,252	--
Colorado	186,423	- 186,423	--
Connecticut	200,036	- 200,036	--
Delaware	159,044	- 159,044	--
Florida	262,035	- 262,035	--
Georgia	225,734	- 225,734	--
Hawaii	162,705	- 162,705	--
Idaho	161,766	- 161,766	--
Illinois	333,395	- 333,395	--
Indiana	235,702	- 235,702	--
Iowa	196,617	- 196,617	--
Kansas	187,113	- 187,113	--
Kentucky	203,123	- 203,123	--
Louisiana	210,117	- 210,117	--
Maine	166,397	- 166,397	--
Maryland	214,725	- 214,725	--
Massachusetts	243,879	- 243,879	--
Michigan	296,450	- 296,450	--
Minnesota	212,789	- 212,789	--
Mississippi	186,582	- 186,582	--
Missouri	227,183	- 227,183	--
Montana	161,459	- 161,459	--
Nebraska	174,484	- 174,484	--
Nevada	158,065	- 158,065	--
New Hampshire	162,173	- 162,173	--
New Jersey	268,284	- 268,284	--
New Mexico	166,765	- 166,765	--
New York	450,171	- 450,171	--
North Carolina	233,861	- 233,861	--
North Dakota	160,194	- 160,194	--
Ohio	325,772	- 325,772	--
Oklahoma	192,231	- 192,231	--
Oregon	184,511	- 184,511	--
Pennsylvania	344,614	- 344,614	--
Puerto Rico	194,752	- 194,752	--
Rhode Island	165,672	- 165,672	--
South Carolina	192,747	- 192,747	--
South Dakota	160,994	- 160,994	--
Tennessee	214,754	- 214,754	--
Texas	334,760	- 334,760	--
Utah	167,479	- 167,479	--
Vermont	157,339	- 157,339	--
Virginia	226,706	- 226,706	--
Washington	206,256	- 206,256	--
West Virginia	178,782	- 178,782	--
Wisconsin	222,902	- 222,902	--
Wyoming	155,485	- 155,485	--
District of Columbia	162,483	- 162,483	--
Guam	151,403	- 151,403	--
Virgin Islands	151,031	- 151,031	--
TOTAL	\$11,500,000	\$-11,500,000	--

Table II

APPROPRIATION FOR PAYMENTS TO STATES

Basis of Allotment and Matching Required, Fiscal Year 1980

Item	: Total Estimate : : 1980 :	: Allotment :	: Amount Paid: Without Matching :	: Amount Required Matching :
Smith-Lever Act:	\$189,601,000			
Section 3(b)		\$ 56,475,091 - Fixed by Section 3(b) of PL 87-749:	\$ 14,513,808	\$ 41,961,283
		1,544,909 - Special Need:	--	1,544,909
Section 3(c)		89,533,000	3,461,320	86,071,680
		34,348,672 - by farm population		
		34,348,672 - by rural population		
		17,374,336 - equally; and		
		3,461,320 - for federal administration and coordination		
		Sec. 3(c) <sup>1</sup>		
Section 3(d)		9,770,000 - Allocated on basis of approved projects.	9,770,000	--
Retirement & Employee Compensation Cost:		16,033,000 - Federal contribution to these funds	16,033,000	--
Penalty Mail		16,245,000 - Reimbursement to the Postal Service	16,245,000	--
Title XIV, Food & Agr'l. Act, 1977:				
Section 1417, Competitive Education Grants	\$1,250,000	1,250,000 - Allocated on basis of approved proposals	1,250,000	--
Section 1425, Nutrition Education Program	50,560,000	50,560,000 - 10% equally remainder on percent of poor in U.S.	50,560,000	--
Section 1444, 1890 Land-Grant Colleges	10,115,000	10,115,000 - 4% Federal Adm., balance paid to 1890 Colleges and Tuskegee	10,115,000	--
D. C. Public Postsecondary Education Reorganization Act	910,000	910,000 - to District of Columbia for Federal administration & coordination	36,400	873,600
TOTAL	\$252,436,000	\$252,436,000	\$121,984,528	\$130,451,472

Table III

SOURCES OF FUNDS ALLOTTED FOR COOPERATIVE EXTENSION WORK

For Fiscal Year Ending September 30, 1979

States	Grand Total	Total Federal Funds	Total Within States	Funds From Federal Sources			Funds From Non-Federal Sources		
				Smith-Lever Act 1/	Title V, RD Act of 1972	P.L. 95-113 Sec. 1444	State (Est.)	County (Est.)	Non-Tax (Est.)
Alabama	\$ 17,980,135	\$ 7,230,768	\$ 10,749,367	\$ 6,087,278	\$ 46,580	\$1,096,910	\$ 8,916,378	\$ 1,640,410	\$ 192,579
Alaska	1,943,820	726,494	1,217,326	714,261	12,233	--	1,217,326	--	--
Arizona	5,200,277	1,519,615	3,680,662	1,502,152	17,463	--	2,967,550	169,730	543,382
Arkansas	13,167,230	5,260,221	7,907,009	4,745,787	40,882	473,552	6,994,228	872,281	40,500
California	30,000,180	7,123,818	22,876,362	7,069,048	54,770	--	17,322,734	4,312,677	1,240,951
Colorado	9,384,472	2,065,907	7,318,565	2,040,754	25,153	--	4,248,684	2,797,720	272,161
Connecticut	3,249,129	1,565,091	1,684,038	1,543,558	21,533	--	1,684,038	--	--
Delaware	1,813,883	1,068,836	745,047	866,360	13,180	189,296	631,183	8,600	105,264
Florida	19,257,326	4,624,192	14,633,134	4,169,328	36,542	418,322	7,322,384	7,000,750	310,000
Georgia	23,591,664	7,475,117	16,116,547	6,806,935	53,558	614,624	11,907,300	3,139,191	1,070,056
Guam	667,230	478,731	188,499	478,731	--	--	188,499	--	--
Hawaii	3,129,501	1,006,700	2,122,801	994,380	12,320	--	2,122,801	--	--
Idaho	5,685,755	1,657,555	4,028,200	1,633,864	23,691	--	2,796,100	1,100,000	132,100
Illinois	18,490,399	7,352,732	11,137,667	7,273,584	79,148	--	8,144,237	1,394,889	1,598,541
Indiana	15,533,022	5,624,295	9,908,727	5,551,273	73,022	--	4,550,832	4,664,339	693,556
Iowa	16,836,625	5,707,625	11,129,000	5,630,598	77,027	--	6,790,000	4,230,000	109,000
Kansas	16,602,498	3,565,813	13,036,685	3,521,781	44,032	--	4,937,901	6,215,654	1,883,130
Kentucky	16,364,418	7,187,582	9,176,836	6,385,160	69,400	733,022	6,268,335	2,908,501	--
Louisiana	15,888,360	5,489,025	10,399,335	4,992,969	39,228	456,828	9,868,339	523,944	7,052
Maine	3,500,754	1,596,917	1,903,837	1,577,609	19,308	--	1,403,600	480,737	19,500
Maryland	8,706,174	3,051,137	5,655,037	2,668,577	29,539	353,021	4,427,692	1,211,105	16,240
Massachusetts	5,673,967	2,480,460	3,193,507	2,455,675	24,785	--	1,001,606	2,191,901	--
Michigan	20,069,473	6,390,653	13,678,820	6,319,441	71,212	--	9,220,400	4,458,420	--
Minnesota	16,446,713	5,476,848	10,969,865	5,404,321	72,527	--	7,098,232	3,819,203	52,430
Mississippi	16,817,231	6,765,653	10,051,578	6,139,384	48,410	577,859	8,481,084	1,402,451	168,043
Missouri	18,048,747	6,889,947	11,158,800	6,127,326	65,219	697,402	8,173,713	1,933,709	1,051,378
Montana	4,502,524	1,590,920	2,911,604	1,568,390	22,530	--	1,270,190	1,489,347	152,067
Nebraska	11,239,117	3,182,944	8,056,173	3,141,772	41,172	--	4,671,549	2,987,524	397,100
Nevada	2,592,701	728,596	1,864,105	716,652	11,944	--	1,300,584	563,521	--
New Hampshire	2,305,738	1,040,193	1,265,545	1,024,696	15,497	--	650,715	600,830	14,000
New Jersey	8,020,355	2,529,683	5,490,672	2,504,853	24,830	--	3,089,466	2,401,206	--
New Mexico	4,258,094	1,545,487	2,712,607	1,527,484	18,003	--	2,017,000	695,607	--
New York	25,543,460	7,849,871	17,693,589	7,782,309	67,562	--	4,840,267	11,453,322	1,400,000
North Carolina	26,980,309	10,113,140	16,867,169	9,058,497	87,655	966,988	11,659,369	5,000,000	207,800
North Dakota	5,836,727	2,154,074	3,682,653	2,124,513	29,561	--	1,972,953	1,361,703	347,997
Ohio	18,914,581	7,739,732	11,174,849	7,654,994	84,738	--	5,713,449	5,016,000	445,400
Oklahoma	12,554,956	4,560,868	7,994,088	4,082,761	38,893	439,214	5,123,108	2,270,980	600,000
Oregon	10,590,466	2,276,648	8,313,818	2,246,723	29,925	--	5,660,405	1,974,697	678,716
Pennsylvania	14,453,306	8,043,306	6,410,000	7,961,480	81,826	--	3,910,000	2,500,000	--
Puerto Rico	9,210,101	5,559,124	3,650,977	5,502,082	57,042	--	2,959,149	566,100	125,728
Rhode Island	1,485,429	850,176	635,253	838,311	11,865	--	568,415	66,838	--
South Carolina	13,924,818	5,412,945	8,511,873	4,875,358	40,861	496,726	8,454,373	57,500	--
South Dakota	5,583,397	2,229,182	3,354,215	2,198,249	30,933	--	2,521,368	816,811	16,036
Tennessee	15,586,019	7,636,979	7,949,040	6,860,662	64,437	711,880	6,216,900	1,561,840	170,300
Texas	36,017,704	12,075,485	23,942,219	11,120,007	80,942	874,536	17,418,002	6,347,514	176,703
Utah	4,826,859	1,171,163	3,655,696	1,155,723	15,440	--	2,937,310	633,386	85,000
Vermont	2,748,956	1,144,646	1,604,310	1,127,789	16,857	--	1,359,979	234,931	9,400
Virginia	21,797,126	6,235,914	15,561,212	5,571,717	53,977	610,220	11,889,480	3,671,732	--
Virgin Islands	578,386	463,386	115,000	463,386	--	--	115,000	--	--
Washington	9,062,132	2,788,659	6,273,473	2,754,151	34,508	--	3,858,780	2,414,693	--
West Virginia	6,509,006	3,274,924	3,234,082	3,243,649	31,275	--	1,671,325	1,553,493	9,264
Wisconsin	19,046,512	5,526,207	13,520,305	5,454,012	72,195	--	7,382,325	5,872,825	265,155
Wyoming	2,879,460	970,187	1,909,273	955,417	14,770	--	1,304,614	604,659	--
Unallotted	2,125,909	2,125,909	--	1,875,909	250,000	--	--	--	--
GRAND TOTAL	\$623,223,131	\$220,202,080	\$403,021,051	\$208,091,680	\$2,400,000	\$9,710,400	\$269,221,251	\$119,193,271	\$14,606,529
2/									
District of Columbia	1,699,200	873,600	825,600	873,600	--	--	825,600	--	--

1/ Does not include special need allocation

2/ O. C. Public Postsecondary Education Reorganization Act



Table IV

COOPERATIVE EXTENSION AGENTS, BY ORGANIZATION CLASSES  
(Man-Year Equivalents)

Extension Workers by Organization Classes	Fiscal Year 1977	Fiscal Year 1978	Fiscal Year 1979
<u>State Workers:</u>			
Directors and Administrative personnel.....	460	481	487
Specialists.....	4,179	4,210	3,410
Total, State Staff.....	4,639	4,691	3,897
<u>County Workers:</u>			
Leaders and Supervisors.....	647	688	696
Area Agents.....	1,343	1,360	732
County Extension Agents.....	9,650	9,741	11,342
Total, County Staff.....	11,640	11,789	12,770
Grand Total.....	16,279	16,480	16,667

NOTE: In accordance with the recommendations of the Extension Committee on Organization and Policy, (ECOP), multi-county staff are being reported under the category "County Extension Agents" instead of "Area Agents" beginning in FY 1979.



## SCIENCE AND EDUCATION ADMINISTRATION - EXTENSION

### STATUS OF PROGRAM

SEA-Extension is the educational arm of the Department of Agriculture and the Federal member of a nationwide educational delivery system that reaches into virtually every county in the United States and its territories. The education is off-campus and informal. It is conducted by the State Cooperative Extension Services, which are a part of the Nation's land-grant universities.

The "educators" include 16,000 Extension agents and over 10,000 aides or paraprofessionals, as well as hundreds of thousands of volunteers. The "students" are farmers, other businessmen, families, youth, consumers and community leaders. Backing up the system is the research competency of the land-grant universities, the Agricultural Research and program agencies of the United States Department of Agriculture.

It is a grass-roots system with the local people, the land-grant universities, and the USDA sharing the responsibility of determining the educational needs and program design. Currently, programs are organized under four categories --agriculture and natural resources, home economics, community development, and 4-H youth development. National concerns now addressed under these categories include pest management, pollution, energy conservation, nutrition education, management of private forest lands, and the needs of small farmers.

As a full partner in this system, SEA-Extension provides leadership, ideas and funds. Federal funds account for about 40% of the total dollars spent on Extension education (in 1978, about 260 million out of a total \$630 million). State and county funds account for the rest. The private sector also supports the 4-H youth programs of the Extension system.

Some 60% of the Federal funds for Extension are administered by the SEA-Extension Service under the formula provisions of the Smith-Lever Act. Other special appropriations include nutrition education for low income people, Extension programs conducted by 1890 land grant colleges and Tuskegee, rural development, farm safety, pest management, pesticide impact assessment, urban gardening and aid to land grant colleges under the Bankhead-Jones Act.

### PAYMENTS UNDER THE SMITH-LEVER ACT

Funds appropriated under the Smith-Lever Act represent a major portion of the total Federal payments to State Extension Services in support of the National extension system. These funds are distributed to each state, Puerto Rico, Guam, and the Virgin Islands primarily on the basis of its farm and rural populations and to a degree on the basis of special problems and needs. These funds are used primarily for the employment of State, area, and County extension personnel who work with individuals, families, community organization, marketing concerns, and others by providing advice and assistance in the application of improved method for Agricultural production and marketing, and Forestry and Natural Resources, Human Nutrition, family living, community development and youth development (4-H).

The following is a description of current activities and selected examples of accomplishments from these appropriated funds:

#### 1. Agriculture and Natural Resources

Current Activities: Agriculture and natural resource Extension programs account for 41 percent of Extension's professional staff time. These programs cover a wide range of subjects. Among the important current



areas of emphasis are integrated pest management, work with commodity-industry groups, weather, urban gardening, pesticide impact assessment, pollution, energy conservation, safety, and business management.

Extension programs are underway with the wheat, soybean, cotton, swine, beef and sheep industries. Through these commodity-industry programs, industry leaders, Extension specialists and researchers from national and state levels identify problems, determine educational priorities, and develop educational materials that can be used throughout the country. The results are improved quality materials and reduced costs of preparation.

Natural resource Extension is receiving new attention. This year the Agriculture and Natural Resources staff was reorganized into two staffs. An assistant deputy director is being employed to head the Natural Resources staff. Under the restructured organization, educational programs will be expanded to help private, non-industrial forest land-owners increase forestry output. Fish and wildlife Extension programs have already been strengthened through an agreement with the Fish and Wildlife service of the Department of the Interior to expand support for fish and wildlife Extension education.

Non-point source pollution is receiving increased attention as EPA's Section 208 program is introduced into rural communities across the Nation. Earlier this year, a memorandum of agreement was signed by Extension and EPA to provide for the development of educational programs to assist state and local communities and farmers develop and implement effective water quality management programs related to non-point sources of pollution. Extension will also assist in the development, dissemination and practical application of technical information pertaining to "best management practices": for controlling agriculturally and silviculturally related non-point sources of pollution.

#### Selected Examples of Recent Progress:

- Extension pest management funds were made available for a nationwide program in FY 1978. The State Cooperative Extension Services, using federal, state, and county resources, expanded the programs in states where pilot projects existed for three to seven years, and programs were initiated in other states. More and more crops and acreages are being covered by integrated pest management with increased financial support from growers. Current programs are concerned with managing insects, weeds, nematodes, and plant diseases as appropriate. Pest management services are being expanded through farmer cooperatives, private consultants and grower organizations.

Dollars saved and more realized net income are reflected throughout the many IPM projects now underway in all the states. Grower benefits from IPM practices increase as the program matures. This relates to growers becoming more familiar with pest management objectives and to greater confidence in the program. Growers become more involved each year they participate and obtain greater benefits from the program. Of special interest is the overall reduction of grower costs (fewer chemicals, less labor) for pest control, and the reduced insecticide use which contributes to a better environment.

In Louisiana, growers have made effective use of the Extension cotton pest management program. In 1975, it was estimated that the average number of insecticide applications made to cotton was about 11 per acre per season. During 1978 it was about 8 applications. This is equivalent to about 1.5 million acre applications fewer of insecticide applied in 1978 than 3 years ago before the cotton pest management program got underway effectively.

In Arizona, the average number of treatments per acre are slowly dropping as growers continue to participate in the program. In 1977, a severe cotton insect year, non-participants treated an average of 15 or more times, while IPM participants treated only 8 times and spent less than \$55 an acre compared to about \$100 per acre for non-participants.

In California, some 90 percent of pear growers now follow University of California pest management recommendations or recommendations modified by private consultants for fire blight. Preliminary data suggests that more than \$750,000 was saved in California by reducing pesticide use after the IPM program was adopted.

An outbreak of soybean podworms in Delaware in 1977, has contributed strongly to grower awareness of the importance of using IPM. A late season outbreak of podworms was successfully predicted by IPM specialists. At least 40 percent of the state's soybean crop had to be treated. Untreated check plots and untreated soybean fields yielded only from one to ten bushels per acre. (Average yield is 28 bushels per acre). The overall savings that resulted from control of podworms was approximately \$7,560,000 or \$108 per acre for the state.

- Extension has initiated the development of a National Agricultural Weather Network (NAWN) in cooperation with the National Weather Service to help farmers minimize the impacts of adverse weather and to improve the control of pests. A pilot project begun in 1975 in cooperation with the Maryland Extension Service and the National Weather Service was expanded in 1978 to include Connecticut, New York, Virginia, North Carolina, Florida, Ohio, Michigan, Illinois, Wisconsin, Kansas and California. Volunteers telephone daily local weather data to a computer at the National Weather Service. State Extension specialists use the data to make recommendations to farmers in their area.

Another phase of this program is an experimental weather/market information program initiated in FY 1978. A "green thumb" box is used by the farmer to get local weather forecasts, market information and other data. The "box" is attached to the farmer's TV and telephone. He can then dial a special telephone number 24 hours a day, and be linked to a small computer in the county Extension office. The county computer transmits programmed data to the farmer's TV for viewing at his convenience.

The experiment is being conducted in two Kentucky counties through a cooperative agreement between SEA-Extension, and the Kentucky Extension in cooperation with the National Weather Service. There are four basic elements in the program: gathering weather data from volunteer observers in rural areas, preparing specialized weather and agricultural information, disseminating the information directly to farmers, and a comprehensive educational program to teach farmers how to realize maximum benefits from the information.

- USDA in cooperation with Community Services Administration and ACTION sponsored five regional Small Farm Conferences during the summer of 1978. The Four Corners Regional Commission participated in funding the conference held in the Southwest. A total of 408 farmers and spouses served as delegates to the Conferences held in Montgomery, Alabama; Des Moines, Iowa; La Grande, Oregon; Albuquerque, New Mexico; and Poland Spring, Maine. Approximately 8 farmers or spouses were selected from each state by an ad hoc committee to represent the small farmers from their communities.

The conferences were designed to provide a national voice for small farmers, to identify their major problems, and to give them more direct access to Federal programs intended to assist small farmers and their families. The delegates to the conferences identified these major concerns:

- Prices for agricultural commodities are too low, coupled with inflation and increased cost of production.
- Small farmers with low volume production are at a disadvantage in marketing their products.
- They perceive that the U.S. has a planned "cheap food" policy and feel the government should not use agricultural products as a diplomatic tool.
- USDA agencies with programs for small farmers need to greatly speed up the processing of applications and service.
- Research is needed on development of job opportunities for small farmers and families in rural areas.
- Consumers should be better informed in the actual cost of producing food on the farm.

The U.S. has a total of approximately 1.8 million small, limited resource farmers. Extension small farm programs in Texas, Missouri, North Carolina and other states are using paraprofessionals to work intensively with small farmers to improve management techniques.

In Missouri, the pilot program showed a cost benefit ratio of 3.5 to 1 when analyzed. More than 1,800 families participated in the Missouri Small Farm Family program in 1977.

Follow-up from the Small Farms Conferences includes:

- Rural Development Committee chairmen in each state are holding regional meetings to produce a Regional Small Farm Plan of Action. This includes a Small Farms Task Force for each state.
- USDA agencies are exploring ways to make adjustments in programs for small farmers, to increase benefits. Farmers Home Administration will administer the Agricultural Credit Act of 1978;



Extension programs for small farmers will be emphasized as budget and staff can be redirected; Southern Extension Farm Management Workshop on October 25-27, 1978, featured the Small Farm Problem and Programs.

Extension is reaching a large portion of the small farm audience with on-going programs, since two-thirds of the farmers in many counties are in this group. For example, Agent Bob Gene Spears, Cullman County, Alabama, reports that he had 5,089 farmers at 55 commodity meetings and 62 percent of them sold \$20,000 or less in agricultural products annually. He spends 75 percent of his time serving the small farmers in his county.

This pattern is duplicated all over the Nation, but has low visibility because it is part of the routine service to small and large farmers, without publicity as a "new program".

- Extension programs have continued to play a significant role in the increased understanding by soybean and grain producers regarding their marketing options. A recent study estimated that more than 10 percent of the producers are hedging their soybeans and grains. An even larger number are aware of the market information related to futures trading that can be used to their benefit. While many farmers are not in a position to hedge their soybeans and grain, many more are using forward pricing or delayed pricing practices. A recent study completed in Illinois indicated that more than half the soybean and corn farmers in that State were using forward pricing or delayed pricing.
- Better methods to provide educational information was demonstrated through an Extension educational program at Michigan State University to help the public better understand the implications of U.S. agricultural exports to the general economy and agriculture. The project involved the development and testing of an educational communication package designed to employ the mass media in a comprehensive information delivery program to the public. The mass media uses included television, radio, newspapers, and the traditional Extension group meeting approach. Pre-test and post-test surveys were used to measure the impact with a control group comparison. It was found through this project that the mass media can be valuable in communicating complex ideas to the general public and that the public can learn this kind of information through mass media sources.
- Extension has continued the educational component in the area of transportation. These include an expansion of programs previously aimed at assisting agricultural businesses, farmers, and rural

communities to understand rail abandonment, subsidy problems, and the need for planning a total transportation system. SEA-Extension has taken a lead role in USDA to develop the research and educational approaches to assist these groups and transportation firms to understand the need for, and the development of criteria for participation in rail plan hearings. Through Extension, USDA is encouraging State departments of transportation to work closely with the agricultural interests to help assure that appropriate consideration is given agricultural and rural interests in the development of the State rail plans. Currently, Extension is working with State Extension Services to develop demonstration projects which will further these efforts.

- U.S. Dairy farmers have the opportunity to participate in new dairy management programs to increase their net profit. These programs offer current information on dairy farm financial planning and the use of computers to help them immediately analyze their business and also make long-range decisions. These programs are available to them in suggested dairy budget guidelines for changing the size of their operations and in analysis handbooks that give cost estimates for specific operations and help them understand enterprise budgeting.

The National Cooperative Dairy Herd Improvement Program (NCDHIP), an Extension-Research-industry effort, is changing in organizational structure and scope of participation. In 1978, 36 percent of all U.S. dairy cows were enrolled in one of NCDHIP's testing programs. This is almost 4 million cows in about 58,500 dairy herds. The cows on the best plan -- "the Official Plan" -- with an average production level of 14,500 pounds, produced some 4,250 pounds of milk more than cows not on test. At \$10 per 100 pounds, this is \$425 more per cow per year and provides test dairymen \$1.15 billion more than those dairymen whose herds are not using this program.

Over 100,000 cows are tested monthly for protein as a support to component pricing of milk. A Sire Summary based on milk fat, protein, and solids-not-fat, has been calculated to provide dairymen with genetic information to help them select sires to develop future dairy herds to produce higher quality milk for consumers.

DHIA (a partnership between the USDA, NDHIA, and other organizations of the dairy industry), through Extension efforts, is providing research data to several dairy industry organizations, land-grant colleges, and government agencies for education, research, and genetic improvement. Sire Summaries as produced by USDA, are published twice a year. The records of about 6 million cows are included in each of these Sire Summaries. Each Sire Summary summarizes 12,000 bulls, or about 18,000 per year. There are 9 million cows and 17 million records included in the data bank. Sire Summaries are widely distributed to bull studs and Extension workers as well as to dairymen. The U.S. is fortunate to have the best national dairy cattle breeding program in the world. We are exporting cattle and semen to all nations at reasonable prices.

-- Boll Weevil Trials - The first year of the three-year Boll Weevil Trials was completed in FY 1978. Cotton is America's fourth leading crop, contributing over \$4 billion to the U.S. economy each year. Boll weevils are the key pest of cotton, costing farmers nearly \$250 million in crop losses and another \$90 million in pesticide use each year. Boll weevil control has accounted for nearly one-third of the pesticides used in U.S. agriculture over the years.

Because of uncertainties as to which boll weevil/cotton insect management system would be most cost-effective and environmentally acceptable if implemented beltwide, the Department has initiated two area trials: (1) the Boll Weevil Eradication Trial in North Carolina, which is being coordinated by the Animal and Plant Health Inspection Service, and (2) the Boll Weevil Optimum Pest Management Trial in Mississippi, which is being coordinated by SEA-Extension.

An integral part of the trials is the evaluation process. Four evaluation teams: (1) Economic Evaluation, (2) Biological Evaluation, (3) Environmental Evaluation, and (4) Overall Evaluation, are monitoring the two trials so that, once completed, valid and appropriate data will be available to determine the best strategy to use against the cotton boll weevil on a beltwide basis. Membership on the evaluation teams is composed of representatives of the Animal and Plant Health Inspection Service, the Economics, Statistics, and Cooperatives Service, the Science and Education Administration, other Federal agencies, States and universities.

The Optimum Pest Management Trial is being conducted in Panola County, Mississippi by SEA-Extension and the Mississippi Cooperative Extension Service. The objective of the Optimum Pest Management Trial is to determine if the boll weevil and other cotton pests can be kept below damaging levels by voluntary participation of growers in pest management techniques. This program will be compared against the eradication trial and current insect control programs. The same tools will be used as in the eradication trial except for the sterile insect release program.

The program is on schedule and is meeting its goals. So far, 98.7% of the area farmers have been recruited and are participating -- only 26 farmers and 417 acres are not in the 31,592 acre program. Before the project started, there were no private Integrated Pest Management (IPM) consultants operating in the county. In 1978, 24,000 acres were scouted by private consultants. The remaining program acres were scouted by grower IPM organizations. Growers pay all costs attendant to scouting fields and Extension provides training and informational materials. Less than 400 acres had to be sprayed for boll weevils by late July, whereas several years ago, all fields would have reached economic thresholds requiring extensive spraying in July. Boll weevil trap catches in 1978 ran 50 percent less in August and September than in 1977. Diapause applications were initiated in September 1978 to reduce overwintering populations. Favorable weather conditions, beneficial insects and favorable cotton prices all proved to be bigger factors in control than anticipated.



- Buyers of sheep and lambs can bid on these animals by telephone in Virginia, West Virginia and the Pacific Northwest. They do it via tel-o-auction, an Extension program that is helping sheep producers realize higher returns for their livestock. In Virginia and West Virginia the overall impact of this program has been to increase the price of all lambs by \$2/cwt. This amounts to an additional \$580,000 annual income to the lamb producers in these states. Also, producers who sell through the tel-o-auction receive \$.50/cwt above producers who sell through other marketing channels. Now in its fourth year of operation, the tel-o-auction is credited with raising the price of lambs from 3 to 5 cents per pound across the area it serves. In some instances, producers who sold through the tel-o-auction realized 8 to 10 cents per pound over the prices offered at local markets on the same day. In FY 78, Extension initiated a National cooperative program with the National leadership of private industry.
- Extension programs have helped beef producers improve their efficiency through the use of feed additives, through better production technology, through crossbreeding, and through performance testing. Feed additives will increase the rate and efficiency of gains in feedlot cattle by 5 to 15 percent. In Oklahoma, a \$10.08 million per year additional return was achieved by stocker operators through the use of feed additives. In Ohio, demonstration farms were set up to show beef producers how to improve their breeding stock through improved pastures. The results-- in 1976, nearly half of the 15 demonstration farms produced 100 percent calf crops, and five herds had average weaning weights of 600 pounds. Many other producers are implementing practices used on the demonstration farms as a result of seeing the accomplishments of this program.
- Over the past decade, Extension has conducted a comprehensive educational program for the swine industry in health, nutrition, breeding, management, buildings and equipment, environmental control, waste management, and marketing.

Presently, all State Extension Services are cooperating in the development of a National Pork Industry Handbook that contains educational materials based on the most current research information available. The handbook is rapidly becoming the standard for swine educational programs at all levels within the Land-Grant system. It provides major economies through developing educational materials on a cooperative basis using the best available talent.

This program has contributed significantly toward the following improvements in swine production: (1) increased sow productivity from 1.6 to 1.8 litters per year with an additional .75 pigs per litter; (2) improved feed efficiency by .4 lbs. of feed per pound of gain in market hogs; and (3) reduced lard per hundred pounds of carcass by 14 pounds.

- Educational programs for wheat producers have been expanded over the past year. One concern is assisting producers in better incorporating risk considerations into their marketing, management and production decisions. A pilot project in risk and uncertainty was conducted by Oregon and Oklahoma State Universities. The project involved the development and testing of educational materials to help wheat producers deal with risk and uncertainty in their decisions. A number of publications, slide tape presentations, and several computer programs were prepared. Other State Extension Services are now using these risk and uncertainty materials in their educational programs.

A "cost of production" leaflet containing a simplified worksheet for use by farmers in calculating wheat production costs has been prepared. It is being distributed widely through state and county Extension staffs and is available through state wheat associations.

A wheat producer-Extension committee has identified conservation tillage as an area needing expanded educational attention. As a result, a publication "Conservation Tillage for Wheat in the Great Plains" was published and is being distributed widely within the principal Great Plains states.

- Thirty State Cooperative Extension Services are receiving most of the USDA crop and livestock reports through computer/remote terminal system known as COIN (Computerized Outlook Information Network). A 110 reports containing 286 files are scheduled for the fourth quarter 1978. In addition, State Extension economists are scheduled to enter into the system 31 analyses they make of USDA reports. County/area Extension offices are increasingly obtaining terminals and accessing the reports. Also, daily grain market reports and outlook related USDA news releases are entered into the computerized system. All formal reports are released at 3 p.m. Washington time. These reports are scheduled to be on COIN within the hour they are released. States are able to obtain most of the reports the day they are released instead of depending on the mails which means a delay of 3 to 10 days.
- A continuing program of educational work in cotton ginning is underway in the 14 major cotton growing states. This program is oriented toward the engineering aspects of cotton ginning. It is presently giving emphasis to improved efficiency in the utilization of manpower and horsepower in cotton ginning operations; implementation of the OSHA cotton dust standard for cotton gins and fiber quality preservation through proper machinery sequence, sizing, adjustment, maintenance, and operation. The work is done through State Cooperative Extension Service Agricultural Engineering Specialists and through the various area and state ginners associations of the Cotton Belt. Clinics, publications, and result demonstrations based on public research are the principal techniques employed. Pilot demonstrations in Texas, Arizona, and Mississippi are now being established in computer program simulation modeling to assist ginners with decisionmaking related to engineering economic aspects of gin plant operation and modernization.

- On-farm grain storage is now about 10 million bushels and elevator storage is nearly 6 million bushels. This now permits producers to hold more of their grain for higher prices, usually about \$.50 on corn and \$1 to \$2 on soybeans. It could mean 5 to 10 million dollars extra to Washington County growers. In Washington County, Illinois, a program was initiated in 1975 to increase grain storage from about 3 million bushels in elevators and 5 to 6 million bushels on farms.
- Solar energy plans were developed by Extension for grain drying facilities, for livestock housing, and for other facilities. During the past year, approximately 500 copies of solar plans were sold. A spring 1978 survey showed 75 solar grain drying installations, 55 solar heated livestock buildings, 25 solar heated workshops, and 3 solar hay drying installations.
- More than 75 people have been trained as "Master Gardeners" under the Urban Gardening Program. They receive 30 hours of lecture on home gardening problems, return 60 hours in service or about 4,500 hours total help in county offices, on tours and in shopping centers. An estimated 800,000 home gardens each producing about \$200 worth of vegetables above cost in 1978 represents a saving of \$160 million to Illinois families plus the recreation value. The Chicago Urban Gardening program saw a 57 percent increase in program participants this year with 12,301 registered, and an 89 percent increase in volunteers.

## 2. Home Economics

Current Activities: Roughly 22.9 percent of Smith-Lever formula funds are used for home economics Extension programs. More than 4,000 home economists, assisted by over 600,000 volunteers, conduct these programs to help families identify their needs, make improved decision, and utilize and conserve their resources to achieve a desired level of living. In FY 1978, Extension educators helped over 30 million families deal with inflation. (This figure represents direct contacts and does not include the millions of mass media contacts.) Target audiences for this help are families with young children, low-income families, the elderly and youth. Extension educators use methods such as mass media, group meetings, personal contacts, shopping mall programs, correspondence courses, computer assisted programs, exhibits and newsletters. Food and nutrition education accounts for about 50 percent of the total home economics Extension effort. Improved health through following good food habits has been a major part of the Extension nutrition program in all States during the past year. In many rural areas, Extension home economists are the only sources to help people interpret the meaning of special diets such as low-fat, low-cholesterol, low-carbohydrate, and to give them the latest research on the relationship of the food they consume to the prevention of degenerative diseases and obesity.

Every State is including food safety as a component of most food and nutrition programs. Food safety is included in all food preservation programs. Its effectiveness is indicated in the low number of cases of botulism and other food poisoning due to home canned foods.



Emphasis has been given to the prevention of foodborne illness by TV and radio programs, newsletters, newspaper columns and features. It has also been included in lessons to homemakers on food preparation and food buying, and to youth through the 4-H program. Extensive use has been made of the visuals and leaflets produced by SEA-Extension.

Family resource management programs are designed to help families and individuals increase their economic stability and effectively manage available resources. These programs concentrate on financial management, debt management and adjustment to inflation. The need for educational assistance here has grown steadily as a result of rising prices and higher personal debt.

Extension educational programs in family relations and child development help families improve practices in resolving conflicts and related incidences of individual and family stress; improve family stability and child development practices. Extension helps individuals and families with interpersonal relationships to understand human growth and development cycles; make personal adjustments for changing societal roles and interact with community and public affairs which affect families.

Energy conservation and management including the financial aspects have been incorporated and emphasized in housing, home furnishings, household equipment and clothing programs, as well as those on food preparation. Home Economists in every state now deal with this problem.

Clothing and textile programs have focused on planning and acquiring adequate and satisfying clothing for the family with less money. Home economists help families improve their selection and buying skills, their ability to construct and renovate clothing, and their understanding of textile-related issues such as flammable fabrics, care labeling, and phosphated detergent.

Home economists devote about 20 percent of staff time to programs in housing, home furnishings, and household equipment. These programs teach low-and-moderate-income families how to improve their housing through home care and maintenance skills and practices. Families learn how to plan to build, renovate, or remodel or obtain housing to meet their needs and use living spaces more effectively and how to extend the life of home furnishings and equipment and to make wise decisions related to energy consumption. Extension health and safety leaders cooperate with local health departments, medical associations, Red Cross, safety councils and police departments, in an effort to reduce illnesses, injuries and the loss of lives. Emphasis is on early detection; cardiac-pulmonary resuscitation; immunization; and heart disease. Safety programs cover home, yard, traffic, as well as farm safety and personal protection.

Every state supports its Extension home economics program with mass media. Current SEA-Extension leadership is being given to a project which encourages states to produce short consumer information TV spots on a regular basis. Over half the states are now reaching millions of consumers by airing these public service spots on commercial TV at prime time.

-- with Extension help, 25 low income rural Michigan families organized a food co-op in order to be able to purchase higher quality food at a lower price. Families improved their nutritional status, while saving an average of \$125 per month per family on food costs.

Total food budget savings for co-op members will be over \$30,000 for the group per year - especially significant since food prices are expected to rise in this year of continued inflation.

- Over 75,000 Louisiana family members received information on energy conservation for the home and automobile in FY 1978. Of this number, over 15,000 were from disadvantaged, low-income families. A random sample of those attending the meetings were surveyed through a mail questionnaire to determine the extent of educational change resulting from this program. Over 70% reported they now have recommended amounts of insulation, caulking and weather-stripping in their homes, or that they have plans to add adequate amounts. Forty percent also reported consistent changes in their living habits to reduce energy waste in the home and family car.
- In four counties, Washington has documented that 43 volunteer "Master Food Preservers" contacted 20,625 individuals in 1977 with food preservation information. Master Food Preservers volunteered approximately 84 hours each in return for an average of 21 hours training by their county Extension agent.
- In East Baton Rouge Parish, Louisiana, nearly 1,000 low-income homemakers received information on pattern and fabric selection, alterations and sewing techniques. Approximately 30,000 garments were completed at an estimated savings of \$300,000 - \$600,000.
- Nearly 6,000 obese persons participated in 257 Alabama groups of "Trim and Slim". This is a weight control program with 10-12 lessons per group. The total weight loss was 48,000 lbs. (An average of 8 pounds per participant).
- Approximately 10,000 North Carolina persons in 28 counties participated in programs related to stress, making an assessment of their own level of stress, taking a brief test for content, and then discussing ways to cope with stress in daily living.
- The Illinois Areawide Housing Project has been a cooperative effort of the Illinois Department of Local Government Affairs, the Farmer's Home Administration and the Community Action Agencies in 9 counties. Community education workers employed through Illinois Cooperative Extension Service have been responsible for communicating information about loans for new housing or for rehabilitating housing in target rural areas of Illinois. If families are not interested in housing loans, the community worker provides referral information to other agencies which may be able to help the family with some problem, i.e., disabled members, unemployment, child care, senior centers and social security among others. A total of 14,608 family contacts have been made. Loans through Farmer's Home Administration were applied for by 925 families, slightly more than 6 percent of the households contacted.
- West Virginia Extension Homemakers in Braxton County were interested in the lives and safety of their older neighbors and friends this past frigid, snowbound winter, and showed it by becoming involved in a telephone reassurance program. All Extension Homemaker clubs in the county participated by checking on neighbors, helping them get food, and seeing that they had fuel for heating, and electrical power.

- During FY 1978, the agent of one Maryland county with a large population of low-income senior citizens recruited and trained a total of forty volunteers to teach nutrition and consumer economics at ten Food and Friends senior citizen feeding sites. Training involved not only subject matter but also the dynamics involved in working with elderly persons. This is a continuing and coordinated effort of the Maryland Cooperative Extension Service and the County Commission on Aging, and reaches an average of 300 seniors monthly.
- The need for information on wills and other aspects of estate planning was emphasized in 40 North Carolina counties in 1977-78. Over 4,000 people were reached with this information.
- Approximately 10,000 families in 11 Louisiana parishes availed themselves of public health services as a result of Extension educational efforts.
- Programs on nutrition for older adults were presented in 72 North Carolina counties and physical fitness program in 26 counties. Extension programs on financial planning for retirement, tax information for the "past 65 set," social security and medicare were presented in 58 counties. Programs on housing safety for elders were given in 37 counties, single home repair for senior citizens in 42 counties, crime prevention and burglar proofing the home for elders were studied in 46 counties. Programs on learning how to select furnishings, also good lighting for elders, were presented in 30 counties.
- Extension's "Consumer Call-In," an educational telephone answering service, originally designed for a target area in the inner city of Chicago was expanded to the entire city of Chicago and more than 16,000 questions were answered this past year. Answers in Spanish are available as approximately 10 percent are Spanish speaking callers.
- Yakima County, Washington, reports food preservation TV spots reached 16,000 households; a weekly foods column in the newspaper reached over 40,000 households; and the Extension newsletter had a circulation of 1,700.
- 1,131 North Dakota residents participated in weight control programs, workshops, classes and individual consultations. Behavior modification in eating habits, value of exercise, general nutrition food selection were learned by 540 elderly, 102 native Americans and 185 other persons in diet clubs.
- Health Fairs were sponsored by Extension Service and other agencies in three West Virginia counties. Clinics for glaucoma, diabetes, multiphase blood screening, self-examination for breast cancer, and learning tests were held. Local doctors, as well as physicians from West Virginia University, were present to assist. Approximately 5,000 persons participated in the three fairs.
- Twenty-one Tennessee counties reported conducting 41 meetings on construction of furnishings and accessories. Over 3,000 people were assisted in constructing more than 3,538 items at a financial saving for their families.



- Over 3,500 Michigan family members have participated in "You Can Do It" home repair workshops and developed home maintenance skills that save the cost of hiring skilled workers. Another 10,000 families received the program by TV.

Research shows that these families have reduced maintenance costs. Michigan residents saved about one half million dollars using the home maintenance skills they learned in Extension programs.

### 3. 4-H Youth Development

Current Activities: Approximately 28.4 percent of Extension's professional staff time is devoted to 4-H youth development programs. The major objective of 4-H is to provide education and practical experiences that help youth, wherever they live, become self-directing, productive, and contributing members of society. These programs are operated through a unique partnership of government, land-grant universities, volunteer leaders and private sector. Parent cooperation and participation are important factors in the success of 4-H.

The need for a dynamic, relevant 4-H program is greater today than ever before. All States are implementing 4-H youth development programs which: (1) provide educational experiences for youth directed to their individual self development and as citizens; (2) provide meaningful and practical ways for youth to become engaged in and contribute to many of the important goals of the families and communities of which they are a part; (3) contribute to national goals and the missions of USDA; and (4) enlist and develop volunteers and resource groups to provide community leadership in work with youth, their families and communities. The specific 4-H educational projects and action programs in which youth take part are designed both to meet current youth needs and to provide sound bases for their mature years. Youth select from more than 100 4-H projects directed to the following 4-H objectives:

- Provide young people with practical experiences that will help them prepare for jobs and careers and understand how business and economic system works.
- Involve young people in improving the environment and conserving natural resources.
- Help young people understand how food and fiber are produced, processed, marketed, and consumed.
- Expand opportunities for young people to learn about foods and nutrition.
- Engage young people in conserving energy and learning about energy alternatives.
- Conduct continuing programs to help young people learn about home and family responsibilities.
- Involve young people in practical education for consumer decisions and responsibilities.

- Involve young people in working for better health and safety for individuals and communities.
- Increase youth opportunities to develop leadership and play significant roles in community development activities.
- Help young people develop habits and skills for making wise use of leisure time.
- Continue and expand present youth development (4-H) programs with other nations, particularly with developing nations.
- Develop professional, paraprofessional and volunteer staffs through formal and informal educational programs to improve their effectiveness in working with youth, their parents, and community resource groups.

Participation in 4-H has grown rapidly during the past decade. Total 4-H participation of urban youth has tripled since 1970, while steady growth in participation by rural youth has been maintained. In 1977 the number of youth served by 4-H youth development programs was approximately 5.4 million compared with 5.8 million in 1976. Twenty-five percent of 4-H participants are minority youth.

Growth in 4-H over the past six years is shown below:

	<u>1971</u>	<u>1977</u>
Enrollment in 4-H Clubs.....	2,119,038	2,178,216
Enrollment in 4-H Special Interest Groups.....	370,008	1,894,428
Participation in 4-H Expanded Food-Nutrition Education Programs, primarily for low-income city youth.....	560,238	845,711
Participation in 4-H Instructional TV.....	557,347	535,725

Expansion of 4-H in urban areas has been accompanied by growth in numbers of farm and rural youth enrolling in 4-H clubs and 4-H special interest groups.

	<u>1971</u>	<u>1977</u>
Youth from Farms.....	835,363	879,025
Towns under 10,000 and Open Country.....	1,060,330	1,632,141
Towns and Cities, 10,000-50,000.....	300,780	693,181
Suburbs of Cities 50,000 and over.....	150,281	363,074
Central Cities, 50,000 and over.....	142,292	505,223

Youth in 4-H clubs and 4-H special interest groups enrolled in 8.8 million 4-H educational projects--an average of 2.2 projects per member. Trends in project enrollments for the last 6 year period are as follows:

	<u>1971</u>	<u>1977</u>
Animals and Poultry.....	1,078,897	1,401,520
Plant Science and Crops.....	420,756	669,519

	<u>1971</u>	<u>1977</u>
Energy, Machines & Equipment, Engineering.	596,532	1,004,036
Ecology, Natural Resources.....	495,498	778,005
Economics, Jobs and Careers.....	96,911	143,780
Community Development, Service, Government	630,085	783,750
Leisure Education and Cultural Arts.....	537,936	947,508
Cultural Understanding and Exchanges.....	34,648	89,604
Health, Personal Development, Relationships	679,380	626,471
Individual and Family Resources.....	1,767,170	1,649,452 *
Communication Arts and Sciences.....	271,122	395,040
Introductory, General, Miscellaneous.....	292,385	284,508

\* Does not include participation in 4-H Expanded Food and Nutrition Education Program.

Last year, the States reported that 578,500 adult and teen volunteers served 4-H. Added to this number is a substantial involvement of resource people, business, industry, agricultural and civic groups who give support to 4-H in their local communities. For every hour spent by a professional Extension worker on 4-H, volunteers spent 10 hours.

#### Selected Examples of Recent Progress:

-- In Rhode Island, intensive 4-day training was provided for 30 selected volunteers in the spring of 1978. They learned to train youth in the subjects of wildlife and marine conservation. Since that time these volunteers, with new knowledge and teaching skills, have taught approximately 2,000 youth about environmental concerns at sites including forests, seaside and marshland. Cooperative efforts in the training and reteaching have included the Audubon Society, State Department of Environmental Management, and university specialists.

-- A program designed to make juvenile offenders directly responsible for their actions has been established in Prince George's County, Maryland, under the auspices of the Office of the Youth Coordinator.

The program, titled "Restitution by Juvenile Offenders: An Alternative to Incarceration," and funded by a Federal Law Enforcement Assistance Administration (LEAA) grant, will serve 600 juvenile offenders referred by the courts during the 24 months of the grant. The participants will be required to perform some kind of community service until their restitution costs have been earned, or they may be required to provide a direct service to the victim. Supervision of the juveniles will be provided by the 4-H club and Early Learning, Inc. These organizations will also provide vocational and leadership training to the youths under their guidance.

-- Grant County, Washington, has a youth farm program now in its fourth year. The 4-H program has 10 acres of prime irrigated crop land. Twenty young people, mostly low-income and minority, are employed each summer from June to September, raising truck garden produce. They are paid a minimum wage for 40 hours per week. All the produce is given free to senior citizens' homes in the community. A CETA grant was obtained to pay the salary of the youth workers and their supervisors. The young people learn practical skills in farming, discipline of getting to work on time, the value of work, and practical knowledge of producing, marketing, processing and community service.



- In Washington State, food preservation is a new 4-H program. Young people have been learning the right ways to preserve foods through freezing, drying, and canning. Correct canning procedures are emphasized to prevent botulism and food poisoning. They've built and experimented with solar dryers. They not only learn to preserve food, but learn about energy conservation through the use of alternative energy sources.
- During the 1977-78 4-H year, more than 58,000 Texas young people participated in 4-H animal and poultry science projects under the leadership of adult and teen volunteer leaders and county Extension agents. Through their participation in project meetings, tours, method demonstrations, judging contests, and related experiences, they learned and applied principles of selection, feeds and nutrition, insect and disease control, housing, marketing and economics, and related concepts.
- A therapeutic horseback program for handicapped youngsters in Tarrant County (Ft. Worth), Texas, resulted in a citation from the mayor for the county 4-H staff, and increased self-esteem for 4-H'ers. A co-sponsoring agency made an urgent plea that the Tarrant County program be continued in 1978-79 and expanded to other Texas counties.
- The Florida 4-H Marine Program received a \$63,975 Sea Grant appropriation to employ and support a State 4-H marine education specialist for 2 years. Operating in concert with the Florida Marine Advisory Program, the State 4-H department involved several thousand youth in 4-H marine camps, institutes, exhibits, demonstrations, tours and other learning experiences. Individuals and groups in 35 states have asked for information on the development and implementation of the program.
- The West Virginia 4-H junior volunteer fire department program is designed to teach young people aged 13 to 18 how to become volunteer fire fighters when they are old enough to join an adult department. Approximately 300 youth are involved. The Fire Extension specialists of the West Virginia University Fire Extension Service provide the subject matter base.
- 4-H Business Management workshops have been conducted in Virginia for 5 years. Two workshops are held each year. Financial sponsors of the workshops have been the Virginia State Chamber of Commerce and Local chamber members. Workshops are held on weekends--Friday evening through Sunday noon at 4-H education centers. In addition to the learning sessions, recreational activities are planned.

The objectives of the workshop are for 4-H members to learn the concepts used in business and economics and to appreciate the American economic system, management, labor, production and marketing. Workshop participants are divided into "companies." A money economy is established using "4-H dollars." Companies purchase raw materials and rent equipment from a supply center. They work through a business process, organize themselves, plan, produce, price products and advertise. The highlight is a trade show where goods that have been produced are sold to other workshop participants who also use "4-H dollars."
- 4-H Community Pride programs on three Hawaiian islands have involved planting coconut trees for conservation and beauty. In a recent tidal wave, some of the coconut trees protected both land and buildings from extensive damage. 4-H beautification programs make the community more attractive for local people and enhance the tourist trade.

- Close to 1,300 youngsters in the greater Flint, Michigan, area were reached during the summer months through a mobile Extension center called "The Green Machine". It made the 4-H program more visible to community residents and served as a training facility for urban youth in various craft, sports, and nutrition areas.

Staffed by high school and college students, a Michigan State University intern, and a project coordinator, the old, green, remodeled school bus, equipped with necessary materials and supplies, visited summer school programs, community centers, or housing developments each day. School principals, community education directors, and neighborhood program coordinators noticed a tremendous increase in attendance at their facilities after the "The Green Machine's" involvement. They also noted improved self-image and reduced racial prejudice among their youngsters as a result of the program.

- In Michigan, a 4-H gardening and beautification program attracted 80 urban minority youngsters. They planted vegetables and flowers and were responsible for gardening maintenance. Three adults guided the young people and taught them gardening basics. They planned, planted, watered, weeded, and harvested their own crops. To reinforce their learning experience, they visited three farms to see commercial gardening and horticulture. They saw farm animals, field crops and forestry tracts, watering and irrigation methods. Outdoor cooking and nature hikes and also new experiences.

The 10-week gardening and beautification program helped the participants develop increased pride and self-confidence and acquire knowledge of gardening and horticulture techniques. It helped make local communities more attractive and showed more urban people what 4-H has to offer them.

- The Children's Hospital 4-H Club Program, in Orleans Parish, Louisiana, now in its third year, is an innovative plan to adapt 4-H to the needs of children under long-term medical care. 4-H home economists, paraprofessionals, and volunteers present learning through special projects. Handicrafts are not too difficult. The children learn dexterity and pride in their accomplishments.
- Most State Extension Services are including drug abuse education and teen alcohol prevention programs in their 4-H planning. A 4-H alcohol prevention program in North Carolina is reaching more than 2,000 boys and girls ages 12 to 19, through 4-H clubs, camps, educational forums and other methods.
- Project Share, in Maryland, is designed to bring about interaction and greater sharing between youth and the elderly. It was planned in cooperation with the National Council on Aging and the American Association of Retired Persons. Better understanding between two generations could be an answer to some social and psychological problems of both.
- An extensive International 4-H youth exchange program took place in North Dakota during 1978, when 67 North Dakota 4-H families hosted 64 delegates from six countries. They included 50 Japanese youth and an International 4-H Youth Exchange delegate from the Netherlands, Japan, and Norway, and a professional rural youth leader from Dominica. Host families throughout North Dakota were recruited through county Extension agents. Two intercultural 4-H camps involved 150 youth in a 4-day cross-cultural experience.

#### 4. Community and Rural Development

Current Activities: The Community and Rural Development (CRD) program accounts for about 8 percent of Extension's professional staff time. Extension's basic responsibility in CRD is directed toward improving people's ability to solve community problems and improve the quality of community life.

The primary objectives of Extension's CRD assistance are to facilitate public understanding of issues and alternatives; to stimulate local initiatives; improve the capacity of citizens and their governments to solve their community problems; and to facilitate cooperation among government agencies, local organizations, local officials and concerned citizens.

In accomplishing this task, Extension assists people in understanding economic and social forces, providing them with facts, helping them with the analysis of situations, pointing out available alternatives and new technologies, and in developing a plan of action. In such a process, Extension educators often find themselves in positions as marshallers of resources, directors of a process, and expert consultants. Other roles include liaison, referral, moderating, advising, evaluating, planning and linking with a host of other agencies, programs and resources.

In capacity building, Extension helps community leaders, organizations, and units of government more effectively assess needs and priorities, develop and implement programs and strategies, and improve organizational and management efficiencies. Through these efforts, local communities are better able to solve current problems and have the capacity to more effectively handle future problems where they arise.

Job and Economic Opportunities-Extension programs are designed to help communities improve and sustain their economic bases in order to achieve economic and social goals of their citizens. The objectives are to develop the manpower resources and to create jobs that will increase the personal incomes of workers and the tax base of the community. Extension professionals conduct comprehensive surveys, feasibility studies, and economic development training programs for lay leaders, local officials and development groups seeking to enhance economic opportunity in their community. They work with managers of new and existing businesses needing help in resolving managerial, technical, personnel, and fiscal problems. Extension participates directly in manpower development through widespread use of CETA programs and by helping communities initiate manpower training and job placement programs. In this regard, major emphasis is placed upon helping the unskilled and disadvantaged become productive members of the community.

Health, Housing and Other Community Services and Facilities--With growing taxpayer resistance to increasing costs and expanding public programs, local officials are seeking help. They want help in finding new technology and new ways to meet public demands at lower costs. They are seeking help in getting the citizens in their communities more involved in needs assessment, priority setting and program decisions. Extension is in a unique position to help. With the research base of the universities and staff in virtually every county, Extension is highly accepted and respected for its ability to provide objective education, information and technical assistance. Extension is helping communities get people to consider their needs for local services and facilities and learn about new technologies and arrangements to meet these needs.



Selected Examples of Recent Progress:

- North Dakota Extension offered a five session course on rural business and industrial development in six communities. All communities are now either (1) forming a local development corporation, (2) organizing an industrial development team, (3) carrying out community-wide surveys to identify problems, or (4) setting up action committees to capitalize on development opportunities.
- A training program for boards and staffs of community agencies and organizations has been developed by Missouri Extension staff. The training manual is designed to be used in a "train-the-trainer" setting in which "students" are trained to conduct the training of their own agency boards and staffs, or other groups that may request such assistance. Personnel from 14 community action agencies were provided such training by the Extension during the year.
- Tax system revisions in South Dakota have created an increased demand for information on present and alternative means of supporting public services. State Extension specialists compiled and distributed tax information on every county to all county Extension offices. Public meetings on taxation were held in seven counties in FY-78, with attendance totaling 800. Tax-related education will continue to be emphasized, with six county meetings already scheduled for FY-79.
- In the early 1970s, Pocahontas County, West Virginia, like many rural communities in the state, faced escalating health care problems. Two Extension agents recognized the coming crisis and tried for two years to interest local people in dealing with the dilemma. Interest grew slowly until 1975, when the county hospital said it was going to have to close. Then people really got aroused. The agents, with much of the groundwork already laid, helped establish a seven member local committee to deal with the problem. The upshot was that (1) funding was captured for a rural health clinic, (2) a home health care service was formed and (3) a grant was secured to help plan a comprehensive health care delivery system. The clinic has been operating for 2 1/2 years and has been successful enough to pay back a good part of the funding it received from the Appalachian Regional Commission and the U. S. Department of Health, Education and Welfare.
- In DeSoto Parish, Louisiana, Extension conducted community meetings for both parish leaders and persons with little or no formal education, on factors affecting community growth and development. About 450 people attended. Because of these training sessions, a bond issue was passed in one town, 27 miles of roads were improved, a parish advisory committee was formed, and better citizen rapport with elected officials was established.
- "Growth management" is a new concept which many Washington State communities are just beginning to grasp, as the result of Extension programs dealing with the potential impact of rapid growth. At least 35 of the state's 39 counties are likely to experience "growing pains" from such things as large-scale construction, irrigation, mining, and industrial, recreational and residential growth. Because of its varied educational programs, Extension is now recognized by local planners and county commissioners as a reliable source for objective "growth management" information and education.

- At least 25 percent of all communities in Texas got help from Extension in 1977-78 in planning to improve quality of life. Increased incomes, higher employment, improved services and a better understanding of community development were stressed. These efforts reached into 142 of the state's 254 counties. The scorecard shows 467 community projects, including 86 in business and industrial development.
- The Grafton, West Virginia, city council asked Extension to help them get greater and more representative citizen participation in the budget-making process. The county agent, with the aid of State Extension specialists, suggested a study of residents' needs and wishes. The council and a high school government class helped draw up a questionnaire which was used in a survey of randomly-selected households. Information from the survey helped the council develop priorities, while accentuating the development process. Priorities were street lights, water system reorganization, street repairs and improved garbage collection. The mayor called Extension's help "excellent" and a councilman said, "It's just what we needed." Citizens were happy for the chance to contribute to council decision-making.
- Eight of the 16 award winners in the 1978 North Dakota Community Betterment Contest were targets for concentrated Extension educational efforts in economic development. In two of the four communities that were first-place winners, an Extension economic development course had been completed in the preceding 1 1/2 years.
- Louisiana Extension education carried out through the "1890" program benefited low-income people in 6 parishes. Nearly 270 people were involved in 34 meetings with Farmers Home Administration personnel to improve their understanding of financial assistance available for home construction and repair. Among results: (1) 12 new houses built and 29 repaired or renovated using government and local financing, (2) 368 home visits by Extension workers to help families plan home improvements and (3) 6 community improvement groups organized (the 418 members plan for and act on housing and other problems.)
- In metropolitan St. Louis, Missouri a small group incorporated to develop housing for the inner city area of North Market Street. The leadership for this proposal was provided by the Extension staff at Lincoln University, Missouri's 1890 institution.
- The Alabama Sea Grant Advisory Program, operated by Alabama Extension, focuses on educational programs designed to enhance the development and wise use of the natural and human resources of the state's 600 miles of shoreline. These programs benefit the seafood and recreational industries and promote sound coastal land use planning. Activities have included workshops on shrimping and sports fishing and coastal zone management, and assistance in planning package tour programs. Timely information is disseminated through publication and coastal news media.
- Landowners, mineral owners, mineral producers and local governments in Oklahoma are confronted with many problems related to land use, reclamation, lease agreements and taxing mechanisms. Extension education programs, derived from research, have provided some 600 persons in northeastern Oklahoma with requested information concerning coal production impacts. The programs are influencing behavior of land and mineral owners regarding the environment. A fact sheet on

"The Coal Mining Lease" provides information to aid the prospective lessee.

The programs have also involved the SCS and FmHA agencies in public awareness and information meetings to explain and clarify the provisions of the Federal Surface Mining and Reclamation Act of 1977.

- Extension teamed up with the Alabama Retail Merchants Association in theft prevention workshops for 500 retail store department heads and managers in seven cities. Workshop faculty included security experts from three of the state's major retail chains.
- During two weeks in May 1978, more than 12 inches of rain drenched Sheridan County, Wyoming. Floods ravaged irrigation ditches, fences, bridges, houses and other structures. Extension people responded immediately, pouring out information on what to do and where to get help. The county Extension office answered dozens of questions on polluted wells, health problems and irrigation system damage. Extension information paved the way for 90 people to get federal financial assistance for repairs. Several irrigation companies were able to qualify for 100 percent of the cost of repairs under the Federal Disaster Action Act.

#### FOOD AND NUTRITION EDUCATION PROGRAM (EFNEP)

Current Activities: Adult EFNEP -- Recent census data identified about 5.3 million families in poverty, and studies indicate that many of these families lack a balanced diet or the knowledge to plan a balanced diet. The Expanded Food and Nutrition Education Program (EFNEP), implemented by the USDA and the State Cooperative Extension Services in 1968, has made it possible to expand food and nutrition education programs to this audience. Since family participants in the program are isolated and are reluctant to participate in public education, groups and extension meetings, they need modified teaching on a one-to-one and small group basis.

More than 1.5 million low-income families, representing 6 million family members, have been enrolled in this indepth food and nutrition education program since 1969. Currently, 5,673 program aides trained and supervised by home economists, are employed to reach families in about half of the U.S. counties. Families are taught to improve their diets through increased knowledge of the essentials of nutrition, increased ability to select and buy food, increased ability to prepare and serve balanced meals, and an increased ability to manage resources including gardens, and food stamps, plus improved practices in food preservation storage and sanitation. Emphasis is on enrolling homemakers with young children in the program.

Approximately 449,000 families were enrolled in the program last year. Seventy-three percent of the program families have annual incomes less than \$5,000 with the average size of the family being 3.9 persons. Minorities account for 61% of the family participation. Thirty-nine percent of the participating families have eight grades or less of education.



The effectiveness of the program in changing food consumption practices is measured in three ways: (1) The percentage of enrolled homemakers who attain a minimum adequate diet--one serving of food daily from each of the four food groups (milk, meat, fruit/vegetables, and bread/cereal). This percentage has increased from 51 percent to 76 percent in two years. (2) The number of families with an "optimum" diet (2 servings of milk, 2 servings of meat, 4 servings of fruit/vegetables, and 4 servings of bread/cereal). Sample data show that while only 4 percent of the families entering the program since 1969 had an optimum diet, after two years in the program, that had increased to 21 percent. (3) The percentage of family income spent for food. This has remained stable at about 34 percent, which means that families have improved their diets without increasing their monthly food bill.

Here are some examples of how the Expanded Food and Nutrition Education Program has changed the lives of families:

Selected Examples of Recent Progress:

- An Arkansas nutrition aide reports on one of her families: "Rebecca was living on welfare in a small house when I first contacted her. She purchased food stamps but had little knowledge of their proper use. When I took the first food recall, I found that the family diet consisted of dry beans, macaroni, cheese, chicken and bread. Now the homemaker and her family are eating more of a better balanced diet." The homemaker says, "I didn't know that my children would eat other foods and how much more I could buy with my food dollar."
- Emma is an aide in Pennsylvania's EFNEP. She describes visiting one family of five:..."I was shocked to see the living conditions... one single bed, one chair, no linens or bedding...a hot plate, one plate, one pot, a skillet for cooking. Their meals consisted largely of potatoes and macaroni." Emma helped the homemaker get food stamps; then she taught her to plan and cook simple, balanced meals. She also taught her to shop wisely. "I am immensely proud of that homemaker," says Emma. "She may forget some things I taught her, but she will never revert to her original situation."
- A West Virginia family with six children, who were often ill, with poor grades in school, were crowded into a small four-room house. With the encouragement of an EFNEP aide, they moved to a larger farmhouse. They grew a garden, preserving much of the produce; signed up for food stamps and learned how to shop more economically. The children improved their health and school attendance; all now make better grades. The oldest daughter graduated from high school with honors and went on to college with scholarship support, earning good grades. The next oldest daughter finished high school with honors and received a grant to nursing school. The other children are doing equally well in school and show similar promise. The EFNEP graduation certificate was the first award the homemaker had ever received. She and the children credited EFNEP with stimulating their lives and aiding in gaining these successes.

-- A family moving to the country from Washington, D. C. were living in a small frame house, badly in need of repairs. The homemaker lacked management skills and did not know how to make use of the facilities she had. Through an EFNEP aide, she learned to plan meals, shop economically, cook on a wood stove, plant a garden and preserve 500 quarts of produce. Upon graduation from EFNEP, she joined a county Extension Homemakers Club. Many spinoffs and indirect accomplishments also result from this program.

Homemakers once with the program become teachers of others. Many become volunteer leaders who teach groups and participate in community affairs; aspire to a higher quality of life for their families and improve management of finances, quality of housing, educational level for self and children, employment, family income (many leave welfare rolls); become more knowledgeable and utilize community and agency resources and services available to them, and participate more fully in other Extension and adult education programs. The aides are also inspired to improve their education, community participation, employment skills and their quality of family living.

Current Activities: (4-H EFNEP) Over 800,000 youth are currently participating in Extension's 4-H Expanded Food and Nutrition Education Program, Primarily low-income city youth. More than half of these youth come from minority groups. Participation in 4-H EFNEP has remained fairly stable over the past several years. Since the program began in 1970, approximately 3,500,000 youth have participated.

As a result of this program, youth are learning good nutrition practices, how to improve their diets, and how to make the best use of foods available to them. In addition, youth activities in 4-H EFNEP encourage parental involvement and contribute to the personal development of disadvantaged youth.

Volunteers and program aides, many of them from low-income, minority groups, have been the key to much of the success of this program. Last year 60,526 volunteers worked with youth in 4-H EFNEP.

#### Selected Examples of Recent Progress:

- Rural counties in Indiana have adopted 4-H nutrition day camps to fit community needs. In one county, a van truck carries nutrition educational materials and recreational equipment to 18 rural areas.
- Most of the EFNEP counties in Washington State report positive food behavior changes in youth after they enroll in the series of nutrition lessons. Tests showed that youth became more willing to eat new vegetable dishes. Eighty percent were happy to explore and help prepare new fruits. Tests also showed increased knowledge of the essentials of nutrition.
- Maryland's 4-H program to reach low-income youth with nutrition information reached more than 8,000 this summer. Day camps were the major method used, and a typical effort by Harford County reached 118 youth with emphasis on: (1) identifying foods in the four food groups; (2) identifying vegetable protein sources; (3) number of servings needed daily in each food group; (4) identifying foods that are high in Vitamins A and C and in fiber and energy, learning the functions of Vitamins A and C and fiber and protein.

- Maryland's Anne Arundel County reported working closely with the Recreational Instructional Program; Social Services; USO; and a fire department to bring a nutrition component into the summer activities scheduled for county youth. Pre-tests and post-tests in many other counties demonstrated improved nutritional knowledge.

### 1890 LAND GRANT INSTITUTIONS AND TUSKEGEE INSTITUTE

Current Activities: Sixteen border and Southern states are using funds appropriated specifically for 1890 Colleges and Tuskegee Institute to support Extension projects designed to develop and improve informed decision making skills. State Extension Services are applying this support to increase services to all clientele, especially those with limited resources.

These Extension Services are continuing to develop improved instructional materials and program delivery methodologies to better service previously unreached clientele. Better designed materials and methodologies will help reduce the amount of time staff members spend in individualized instruction, so that more clientele can be assisted in groups, and be more quickly graduated to the full range of available county programs.

### Selected Examples of Recent Progress:

- In Maryland, the 1890 Extension programs have as their major thrust providing educational assistance for new or previously unreached audiences, with emphasis on disadvantaged and limited resource individuals, families and communities. The Farm Institute works in five Eastern Shore counties with small, part-time farmers and home gardeners improving foods for home use and sale. Two housing agents and one housing program assistant are helping the 1890 audiences select new homes and plan renovation of present homes.

Since disadvantaged youth are hard to interest in formal 4-H clubs, the 1890 agents work through special interest groups and special projects that the youth can afford.

- In Louisiana, a pilot project in New Orleans is being conducted with the 1890 home economist on "Consumer Food Buying Practices". The location is in a shopping mall in a low-income area. Ten leaders were trained (by the 1890 home economics specialist and the 1862 nutrition specialist) in buying canned and fresh vegetables, and how to teach this information to low-income clientele. In the first two days of the project, more than 2,000 people appeared at the center for help.
- Booths on meal planning were set up in 11 food stamp offices in one Louisiana parish. Booths were manned two days each month by 1890 staff to assist food stamp recipients with on-the-spot training in meal planning. Training was done through visuals, lectures, and method demonstrations. Training coincided with the dates food stamp and welfare recipients received their checks. More than 7,500 homemakers participated.



- In Arkansas, the 1890 Extension staff enrolled 12,000 persons in a home gardening program and worked with them on a one-to-one basis. About 2,000 other home gardeners were assisted with production and management problems through demonstrations, community meetings, and home and farm meetings. Gardeners are taught how to choose good garden sites, select varieties, use pesticides safely, and harvest and store produce. Participants in this program produced about \$400,000 worth of vegetables in 1978.
- The 1890 program in Arkansas led to establishment of eight farmer's markets, with an income of \$130,000. This income helped pay taxes, remodel homes, and pay for education for youth. The 1890 staff held 28 training meetings for 424 persons, on preparing, displaying, and judging quality of vegetables for markets.
- Special emphasis was given to energy conservation in Arkansas homes this year by 1890 staff. With their guidance, homes have been weatherized, caulked, and insulated. With demonstrations and slide presentations, the staff showed low-income clientele do-it-yourself ways to conserve energy in a program on "Low Cost Ways to Cut Your Utility Bills."
- At Tuskegee Institute, Alabama, one program for limited resource clientele is a swine demonstration project involving about 90 farmers. Tuskegee Extension staff provide technical assistance. Heifer Project International provides pigs to participating farmers. Each farmer gives two pigs from the first litter of each sow to other low-income farmers, to help them get started in swine production.
- Heifer Project International also furnishes beef steers to 4-H youth to raise and enter in 4-H beef shows, with sale proceeds going to a college scholarship fund for low-income youth.

During the summer of 1978, Tuskegee Extension staff operated day camps for boys and girls, with hot meals from the USDA summer food programs, and with resource people to teach them about safety, health services, drug abuse prevention, soil conservation, and job opportunities.

#### RURAL DEVELOPMENT EDUCATION (Title V of Rural Development Act of 1972)

Current Activities: The purpose of Title V is to see what impact the land-grant institutions and their partners can have on rural development, given funds specifically earmarked by Congress for that purpose. The land-grant system and its partners are actively pursuing a wide variety of projects which are significantly improving the quality of life for rural Americans. Besides Extension and the land-grant institutions, FY-78 state plans of work show 119 agencies and organizations other than Extension are actively cooperating in Title V.

Plans of work indicate that the 50 states and Puerto Rico are pursuing education and research focusing on one or some combination of the following geographic areas: 36 statewide, 25 individual county, 15 community-oriented and 10 covering multi-county areas.

Most cooperators are addressing national issues or problem areas. The top 5 priority areas being addressed are (in order and with number of states reporting projects under each):

Economic analysis and development strategies-----	26
Local government organization, operation and finance--	15
Community organization and leadership development----	14
Business and industrial development-----	10
Land use-----	10

(There are 1 to 9 projects underway in 31 other priority program areas.)

#### Selected Examples of Recent Progress:

- Arkansas pilot effort under Title V of the Rural Development Act was begun in Mississippi County in February 1975. Extension worked with county leadership in obtaining needed facilities for their county. As a result of these efforts, a county-wide solid waste system financed through a \$300,000 HUD grant is now in operation, a water system for 600 families has been completed, and a 154-unit housing rental assistance program has been developed to assist disadvantaged families. These projects involved educational, organizational and liaison work with many district, state, and federal agencies.
- Kentucky Title V staff have developed an interactive computer program that will enable Extension agents and lay persons to request information on a county or state basis and receive an instantaneous response in an effort to improve the flow of information from federal and state sources to local users.

This program, called DISK, provides local government officials, decisionmakers, planners and Extension personnel with the community data required for the planning, development and management processes. The needed information is available from one source, eliminating the time-consuming search of numerous census volumes.

#### PAYMENTS TO THE DISTRICT OF COLUMBIA

Current Activities: Fiscal year 1978 was significant for the Cooperative Extension Service of the University of the District of Columbia. Two Extension programs merged (those formerly at Federal City College and Washington Technical Institute). Their combined strengths have made a significant contribution to solving clientele needs.

Selected Examples of Recent Progress:

- In a city where whole neighborhoods border on destruction, and in the face of changing real estate values, the impact of self-help for the homeowner is significant. Extension brings District residents this help in the basic home repair program. Approximately 100 residents completed the first round of sessions and received certificates. A home repair club was formed where participants shared their skills in each others' homes. Some learned so well that they were able to train new students.

The Workshops resulted in positive attention to the program as word of its success spread. Newspaper, television and radio coverage quickly followed.

The home repair workshops are a booming success. They've trained more than 12,000 persons to do their own basic repairs on plumbing, electricity, interior walls, window glazing, caulking and weatherstripping, and insulation.

- There are 475 tenants from the Potomac View Tenants Association in Anacostia, as well as people from other community groups; who are participating in evening Extension meetings. They are getting answers to questions on the legal and financial implications of owning condominiums and on laws protecting their rights as tenants. They are shown how to calculate settlement costs, interest, closing fees, and taxes, and deal with other real estate financial matters.
- The Extension interior design program helps District residents gain knowledge and skills that can alter their behavior by allowing them to alter their immediate environment. The program assists low-income families in home organization and management, showing them how to stretch limited budgets by repairing and remodeling furnishings. It prompts awareness of community resources and how to make the best use of them. Through the contacts made in this program, Extension home economists were able to help families with child care and food preparation problems, and direct families to other appropriate community agencies. The trusting relationships that were built made an opportunity to introduce participants to other areas of home economics teaching. People have developed a greater feeling of self-worth and are learning to cope with uncomfortable circumstances.
- A clothing recycling program gives instruction that can save a person up to \$300 per year, depending upon the amount of time taken to revise and revive garments. Home economists demonstrate that recycling does not have to utilize only old, worn-out clothing.
- Interagency cooperation on nutrition education is essential to meet citywide nutritional needs. Extension cooperates with the Mayor's Commission on food, Nutrition and Health, and other family-oriented organizations to extend nutrition education to all District residents. Elementary school children were reached through plays; bulletin board contests; and song, dance and puppet shows. They shared this information with the adult members of their families.



- A significant accomplishment for the D.C. 4-H Youth Development Program during FY-78, was the International Exchange to the Caribbean Island Nation of Jamaica. Two 4-H agents coordinated the trip with 4-H club personnel in Jamaica, and D. C. volunteer/parent leaders. 4-H club members participated in weekly orientation sessions March through July on the campus of the University of the District of Columbia. They were briefed on the history and culture of Jamaica.

Club members were hosted by 4-H families in Kingston and Montego Bay. Living with families during the 7-day visit, the D.C. youth learned about life in a culture quite different from their own. On their return, the 4-H'ers spread the word in their communities and neighborhoods -- telling and showing what they say of life in Jamaica.

#### AID TO LAND-GRANT COLLEGES FOR FOOD AND AGRICULTURAL SCIENCE EDUCATION

Funds for this program are authorized under section 22 of the Bankhead-Jones Act of 1935 and are provided for support of instruction in agriculture, the mechanic arts, and related fields at the land-grant colleges.

Eleven million five hundred thousand dollars is currently available for this purpose of which \$8,100,000 is allotted and paid to each state, District of Columbia, Puerto Rico, Guam, and the Virgin Islands in equal shares of \$150,000 each. The remainder, \$3,400,000 is allotted and paid according to the population each of these recipients bears to the total population of the country as determined by the last decennial census.



## SCIENCE AND EDUCATION ADMINISTRATION

### Technical Information System

#### Purpose Statement

The Science and Education Administration's Technical Information System (SEA/TIS) (formerly National Agricultural Library) has as its ultimate purpose the dissemination of useful information about agriculture and other related sciences to scientists and researchers, administrators and managers, farmers, and to the general public. TIS makes every effort to meet contemporary needs by contemporary means. In addition to providing traditional library services such as bibliographies, reference services and document delivery to agricultural scientists and researchers, TIS is expanding its role and serving a wider audience by using modern information dissemination technology to its fullest. Traditionally, the library has concentrated its thrust towards the agricultural scientist and researcher. The wider audience includes Federal, state and local administrators, as well as the farmer, the small businessman, public groups at all levels, and the general public.

The keystone and foundation of TIS is the National Agricultural Library which had its mission outlined by the Organic Act of 1862, establishing the Department of Agriculture. The act sets forth a basic mission, "to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most comprehensive and general sense of the word," and placed upon the Secretary the responsibility to "procure and preserve all information concerning agriculture which he can obtain by means of books ..."

During the current decade, the Library has evolved from an institution primarily concerned with the collection, organization and preservation of books and periodicals and their dissemination to USDA scientists and researchers, into a technical information system which is proactive. It is concerned with providing useful information to the farmers, farm supporting institutions, small businesses and the rural and urban consuming public as well as to the USDA and Land-Grant scientist. It is as concerned with providing information to local communities for problem solving as it is in providing a comprehensive bibliography or current awareness service to a scientist involved in a specific area of research.

Since managers of research programs at the Federal, state and local levels must work with limited facilities, equipment, personnel and money resources, they must have current information about ongoing research programs. TIS maintains systems of research in progress to assist these decision makers. Several managerial information systems from other SEA units have been transferred to TIS.

Users of information usually require the information promptly. The index is the key to any comprehensive collection of information. The TIS index to the agricultural literature, AGRICOLA, together with other related machine readable data bases are maintained and offered to agricultural scientists and others to provide them with a complete and fast response to their queries.



TIS provides access to the world's agricultural literature. Both current and historical information is collected and organized for effective utilization by a wide range of users.

TIS operations are carried out at the National Agricultural Library Building at Beltsville, Maryland. Specialized services are provided from a branch library in Washington, D.C., which includes the law collection and social sciences materials.

In addition, several agencies of the Department maintain and finance their own libraries. These libraries are situated at field locations where concentration of work and research staff warrants on-site library services. The Director of SEA prescribes library policy, standards, and procedure for these field library services and exercises such controls as are needed to coordinate services in the Department. The Deputy Director, SEA/TIS, implements these policies, standards and procedures.

As of September 30, 1978, TIS employed 163 permanent full-time employees and 17 part-time employees, all located in Beltsville and Washington.

TECHNICAL INFORMATION SYSTEM

Appropriation Act, 1979.....	\$ 7,527,000
Budget Estimate, 1980.....	<u>7,835,000</u>
Increase in Appropriation.....	<u>+308,000</u>

Adjustments in 1979:

Appropriation Act, 1979.....	\$7,527,000
1979 Supplemental Appropriation for pay costs...	<u>200,000</u>
Adjusted base for 1980.....	\$7,727,000
Budget estimate, 1980.....	<u>7,835,000</u>
Increase over adjusted 1979.....	<u>+108,000</u>

SUMMARY OF INCREASES AND DECREASES  
(on basis of Adjusted appropriation)

Item of change	Increase or Decrease		
	1979 Estimated	Program Changes	1980 Estimated
Regional Document Delivery	\$ 135,000	\$ +35,000	\$ 170,000
Direct Document Delivery	25,000	+24,000	49,000
Automated Record Control System	- -	+45,000	45,000
ALL OTHER	<u>7,567,000</u>	<u>+ 4,000</u>	<u>7,571,000</u>
TOTAL AVAILABLE	<u>\$7,727,000</u>	<u>\$+108,000</u> a/	<u>\$7,835,000</u>

a/ - Includes a total reduction of \$9,000 in travel costs as a part of the Department-wide management initiative to reduce travel costs. Includes a total increases of \$13,000 for the portion of pay increases effective in FY 1979 which were absorbed in FY 1979 but which are needed to carry out the programs proposed in FY 1980.

PROJECT STATEMENT  
(on basis of adjusted appropriation)

Project	: 1978	: 1979 (Estimated)	: Increase	: 1980 (Estimated)
1. Agricultural Library Services for research and education:	: \$6,717,637	: \$7,727,000	: + 108,000(1)	: \$7,835,000
Unobligated balance	: 391,252	: - -	: - -	: - -
Total available or estimate:	<u>7,108,889</u>	<u>7,727,000</u>	<u>+ 108,000</u>	<u>7,835,000</u>
Proposed supplemental for pay increase costs	: - -	: - 200,000	:	:
Total, Appropriation	<u>7,108,889</u>	<u>7,527,000</u>	:	:

## EXPLANATION OF PROGRAM

The basic function of the Technical Information Systems (TIS) unit of the Science and Education Administration is to identify, acquire, disseminate and deliver pertinent food and agriculture information to all scientists, researchers, administrators, and other workers in agricultural fields in both the government and the private sector. To meet these needs, TIS provides current awareness services about the worldwide agricultural literature and makes this information available and accessible to users of these systems which include USDA scientists and other researchers, agricultural scientists at our land-grant universities and other institutions of higher learning and in state agricultural agencies; Federal and State administrators; farmers, farmer institutions, small businesses, and the rural and urban consumers. The on-line interactive bibliographic search and retrieval services are directed toward this purpose. The availability of these on-line data bases has generated an increased demand for all types of library services. The current research and information systems (CRIS) and similar systems were established to respond to this demand.

Acquisitions of agricultural materials continues to be a major activity in carrying out the mission of the Library. Other primary activities for fiscal years 1979 and 1980 are as follows:

<u>Types of Activities</u>	<u>Estimated Productivity</u>	
	<u>FY 79</u>	<u>FY 80</u>
Serial Issues Added	240,000	240,000
Number of Titles Cataloged	15,000	15,000
Articles Indexed	135,000	135,000
Volumes Bound	22,000	22,000
Document Requests filled	131,750	135,750
Reference Inquires Answered	25,000	25,000
Automated Searches Conducted	6,500	7,000

A major objective of program in bibliographic control is to organize and announce agricultural publications so that they can be used. TIS catalogs books and journals newly acquired for the collection and indexed journal articles, conference proceedings, and reports carefully selected from the world's publishing output for their meaningful information on agricultural research. Bibliographic records of these publications are added to the computerized Agricola (Agriculture online Access) data base. From this data base, information is disseminated in a variety of ways. It is accessible through commercial online services. It is also available in printed products.

Resources of the collection are made available through direct loan, inter-library loan of books, and photocopy of documents, primarily journal articles. Literature requests of USDA field employees in several areas of the U.S. are processed with the cooperation of the land-grant university libraries. The resources of these libraries are used first by field employees, with the Library component of SEA/TIS serving as back-up.

Through augmentation of its library and information network, TIS will expand its services including current awareness literature systems and on-line retrieval service to all parts of the agricultural community and the general public. A SEA-wide MIS system will be developed and implemented. TIS will focus its technical information program on three priority thrust areas of SEA: Human Nutrition, Natural Resources and Integrated Pest Management. The Food and Nutrition Information Center will expand its efforts in collecting, organizing and disseminating information about human nutrition research.



Simultaneously, TIS resources will be concentrated in the area of natural resources to complement the on-going current awareness, literature retrieval and document delivery efforts of the Forest Service and the Soil Conservation Service. A current notification and information system for environmental impact statements will be developed and implemented. Its purpose will be to assure the availability to the general public of statements in process and completed. The needs for information on Integrated Pest Management (IPM) activities will be met by designing, developing and implementing an IPM Information Center which will provide research, technical and applications information to scientists, extension specialists, farmers, farm supporting organizations and others.

In addition to the above, SEA/TIS must also provide for preservation of the collection. Preservation involves the microfilming or restoration of important research materials. Materials selected for preservation include USDA documents, unbound serial issues, newspapers, and historical materials.

#### Justification of Increases and Decreases

1. A net increase of \$108,000 for services consisting of:
  - (a) (1) a decrease of \$9,000 for reduced travel.
  - (2) An increase of \$13,000 for FY 1979 pay increases.
  - (b) An increase of \$35,000 for regional document delivery  
(\$135,000 available in FY 1979)

Need for Change: The technical Information Systems began 5 years ago to develop a more supportive document delivery system for USDA personnel at field locations. This was arranged through cooperative agreements with land-grant university libraries grouped into regions covering 24 States. The result has been shorter delivery time at very reasonable costs for 75% of the requests.

To extend these advantages and to have local public institutions serve as the initial and primary sources for routine materials, an increase is needed to expand the system to additional locations. This service will reach an estimated additional 5,000 researchers, conservationists, and support personnel. A small amount of this increase will cover increased costs for the past 3 years at the present 24 States.

Nature of Change: This request would provide for extension of the regional document delivery system to two additional States in the South and two in the Midwest or West. The new region would be established in the Midwest and discussions have progressed to the point of verbal agreement on the regional coordinator and the States to be included where USDA personnel are most in need of this improved service. Cooperative agreements will be utilized for this implementation.

- (c) An increase of \$24,000 for direct document delivery  
(\$25,000 available in FY 1979)

Need for Change. Increased requests from USDA personnel for document delivery services have forced TIS to investigate and utilize alternative sources for direct delivery of select photocopies. The requirement to pay royalty fees to comply with the copyright Act of 1976 has also increased the cost of this service. Two of the alternative sources being utilized are quick delivery from commercial external sources (such as the Institute for Scientific Information) and overseas units such as the British Library, Lending Division, which provides responses on foreign material much of which is not yet available in the United States. Document delivery needs have increased by 20% in 3 years without commensurate increases in budget and staff. Diligent use of direct document support to USDA personnel from external organizations will help to cover these increased needs.

Nature of Change. TIS will change its trial program to a continuing operation through commercial sources as one method of meeting increased demands. Overseas quick single item purchases will be increased as another method of meeting this need.

- (d) An increase of \$45,000 for an automated record control system  
(No funds available in 1979)

Need for Change. A primary objective of TIS is to provide rapid and efficient retrieval and delivery services for information contained in the literature collection to the agricultural research community, consumers, and the general public for their use and benefit.

This is becoming increasingly difficult to achieve through lack of automation of routine record keeping systems which not operate in a manual mode. Several of these exist in service areas which deal directly with the users. They are beginning to deteriorate because of size of files, lack of records on current binding and other operations. The manual systems must be converted where economically feasible and where they offer the potential for improved operation and cost-benefit. Without this transfer to modern methods, length of delivery of services, and increased per transaction handling costs will result. An additional reason for automation of record keeping is the need to maintain a record of copyrighted articles photocopied in order to comply with the Commission on New Technological Uses (CONTU) guidelines and the Copyright Act.

Nature of Change: TIS has begun the design and analysis work required to convert the manual binding records to an automated system which will provide increased access to items in that process, as well as increased production from the binding operation. Similarly, planning has begun on an automated inventory control system to handle incoming document requests to provide more expeditious delivery, improved control of delivery times, and more flexible resource allocation. These two manual operations will be the first to be converted since they most directly affect public services.

## Status of Program

The Science and Education Administration's Technical Information System (SEA/TIS) acquires, stores, retrieves and disseminates useful information resulting from research in the areas of agriculture and forestry, human nutrition, and natural resources to the people of the United States and cooperatively on a world-wide basis. A variety of information products and services are available and accessible to users in all areas of agriculture on a national and international level.

### Current Activities

Technical Information Systems of the Science and Education Administration (SEA/TIS) has, during the past year, intensified its effort to transfer useful information resulting from research in the areas of agriculture and forestry, human nutrition, and natural resources to the people of the United States. Since different audiences require different kinds of information and use it in different ways, three segments of information users have been identified. These are (1) USDA scientists and other researchers, and agricultural scientists at Land-Grant universities and other institutions of higher learning and in state agricultural agencies; (2) Federal and State administrators and managers; and (3) farmers, farm supporting institutions, and the rural and urban consuming public.

Funds have been appropriated for a marketing study designed to test the validity of these assumptions and to determine with precision the kinds of information products and services these user segments want and need. New products and services will be based on the expressed and observed needs of the user, rather than on the perceived needs as determined by SEA/TIS. Other benefits anticipated from this marketing study will be the modification, redirection, or abolition of some products and services. Finally, the data will be used to encourage the private sector information industry to provide marketable, revenue producing, and profitable information services wherever possible.

SEA/TIS has intensified its effort to disseminate information resulting from agricultural and food research. The integration of the research activities and the information transfer activities of USDA into SEA has greatly enhanced TIS flexibility. The transfer of the Current Research Information System (CRIS), Extension Management Information System (EMIS), Current Awareness Literature System (CALIS), and the Program Activity Research Information System (PARIS) programs and staffs into SEA/TIS has had a synergistic impact on the whole operation.

### Selected Examples of recent progress:

#### TIS Automated Information Systems Division

As a result of consolidation and merger, SEA is now able to provide a coordinated approach to meeting the needs of public and private research and technical information users in agriculture by encouraging the maximum utilization of its automated information systems. Among the major systems now managed by TIS is the Current Research Information System (CRIS) which provides information on current agricultural research and AGRICOLA which provides published information on the results of this research. Along with the Current Awareness Literature System (CALIS) and Extension Management Information System, TIS now provides a full spectrum of coordinated information activities to meet the broad-based information needs of users.



For example, an average of 90 percent of the documents requested in the Beltsville area were delivered within 10 days in FY 78 as opposed to an average of 50 percent delivered within 10 days in FY 77.

Natural Resources. Efforts were begun in FY 78 to make the services of SEA/TIS more readily available to the natural resource agencies of USDA. A basis for cooperation and coordination between the Forest Service's WESTFORNET (Western Forest Information Network) and SEA/TIS is maturing. The "EIS: Key to Environmental Impact Statements" index and abstracts, a magnetic tape file of Herner and Co., was added to the AGRICOLA file. The same abstracts, in printed form and published monthly, have been offered at reduced rates to all USDA agencies and cooperating institutions through the SEA/TIS Consolidated Purchasing of Publications Program. While anticipated demand has been slower than was expected, this can be attributed to the fact that the publication is new, and that most potential users still do not understand how much useful information these statements contain. Environmental impact statements and assessments are an underutilized information resource.

#### Current Awareness Literature System

The CALS service which was formerly available only to USDA scientists is now available to scientists of the Land-Grant colleges and universities and other cooperating institutions. CALS allows a researcher to build a "profile" that describes the topics of his interest and the computer-based system provides a list of recently published literature that fits that profile. Current files searched are: Biological Abstracts, Bio-Research Index, Chemical Abstracts, Engineering Index, Food Science and Technology Abstracts, the AGRICOLA file of the National Agricultural Library, World Textile Abstracts, Government Reports Announcement (NTIS), and the full Commonwealth Agricultural Bureaux (CAB) file comprised of multiple abstract journals.

#### Current Research Information System

In connection with the Animal Health and Disease Research Section of the "Farm Bill" PL 95-112, the Animal Health and Disease Science Research Board has recommended that CRIS serve as the data base source for determining the animal health research capacity of eligible institutions. Over 700 research projects conducted at 21 Colleges of Veterinary Medicine were recently documented and added to the CRIS data base.

#### Dissemination and Communication of Information

The TIS published an important and useful newsletter called Management Information Notes (numbered series) on a bi-monthly basis. These series of notices are intended to communicate specific information on useful studies, meetings, and services available to Extension workers in the states who might otherwise be unaware of these services and events. Recent notices on the Program Logic for Automated Teaching Operations (PLATO) learning center study by TIS, planned computer use workshop meetings for Spring 1979 by VPI; and TIS AGRICOLA, CALS and CRIS data base services were examples of recent newsletter items. In addition to these notices, useful publications dealing with extension educational programs and their availability are announced. The effect of these communications notes has been to improve and expand the use of TIS information.

#### Cooperative Efforts

The Environmental Impact Statements (EIS) related to agriculture and the Brucellosis bibliographic data bases were added to the TIS/AID agricultural On Line Access file. These records from the Information Research Press, Inc. and USDA Animal and Plant Health Inspection Service (APHIS), respectively, were added to AGRICOLA to make the AGRICOLA file more comprehensive and useful to individual scientists who need relevant literature references. These enhancements to TIS AGRICOLA will allow the agricultural scientists in these areas of research to keep better informed on new findings and related research in their fields.

TIS is also working with the Extension Service to develop bibliographic systems for extension publications. Two pilot projects are underway, one with 4-H publications in the North Central Region and one with the State of Oklahoma to determine what problems exist and what steps can be taken to develop a system responsive to the needs of Extension.

Denver Public Library. In order to reach the third segment of users (farmers, farm supporting institutions, and the rural and urban public) SEA/TIS signed a cooperative agreement with the Denver Public Library. The library houses the Conservation Library and has been named the Regional Energy-Environment Center. It services 10 Rocky Mountains and Plains States. With the funds provided to the City of Denver by USDA, the Library has been able to hire a special librarian to work closely with agricultural groups and others in providing energy-environment related information. The Conservation Library is able to satisfy directly or cooperatively most of the agriculture related information needs of Colorado and adjoining states. The cooperative agreement calls for an extensive outreach effort. During October 21 public and regional libraries are scheduled for visits by the Conservation Librarian. Participants at the meetings will be the local librarian, extension agents, environmentalists and others interested in energy and the environment. Simultaneously, a coordinated effort is underway between the Conservation Library, SEA/TIS and Extension to appraise the Extension Directors in Arizona, Montana, Nebraska, Nevada, North Dakota, South Dakota, Utah, Wyoming, New Mexico, and Colorado about the Denver resource. The Denver Conservation Library also has led in the establishment of the Western Information Network on Energy (WINE). WINE's membership is expanding to all states and provides a unique outlet for SEA-generated information.

Educating the General Public About National Information Issues. SEA/TIS has cooperated with the National Commission on Libraries and Information Science (NCLIS) and the American Society for Information Science (ASIS) to support the October, 1979, White House Conference on Libraries and Information Services in the preparation and publishing of a pamphlet, Eight Key Issues for the White House Conference on Library and Information Services. The pamphlet highlights key issues and problems of information handling, and 25,000 copies are being distributed for use by the delegates and observers to the State and Territorial Governor's Conferences preceding the White House Conference. SEA/TIS staff contributed considerable professional time to this landmark effort. The work was done on a reimbursable basis.

Food and Nutrition Information and Education Resources Center. The FNIC was last financed by the Food and Nutrition Service under a reimbursable agreement in 1978. The Center continued to operate the Food and Nutrition Information Center for persons involved in Child Nutrition Programs. The categories of users level of service, and number of individuals served remained about the same. However, through 20 new promotion programs, an additional audience of 5,200 was reached. In addition, because of the wider audience the Center will be expected to serve in 1979 FNIC has written and sent FNIC catalogs to the following groups: The Directors of Home Economics at the Federal and State levels; the Extension Nutrition specialists at the State level; the Extension Management Information System's people at the State level; the "Women, Infants and Children" (WIC) program specialists at the Federal and State levels and the State Departments of Education.

Agricultural Sciences Information Network. The concept of an Agricultural Sciences Information Network (ASIN) which has been developing for a decade and has been in operation for the past several years was sanctioned by the Congress in the Farm Bill. The Bill states that it is the policy of the Congress that a structure should be established to coordinate all USDA libraries, the agricultural libraries of colleges and universities, and other information gathering and disseminating groups--both in the public and private sectors--to assure effective access by agricultural scientists and researchers to literature and information about food and agriculture. This recognition by the Congress encourages institutions that cooperated with the National Agricultural Library in the past to continue this program of cooperation and coordination under SEA. Because of the Network, rapid, low cost document delivery is provided to USDA and cooperating institutions, and agricultural and food scientists throughout the United States, from delivery points close to the user. Similarly, the comprehensive on-line retrospective search service and the current awareness service which have been made available to USDA researchers have increased their opportunity to identify literature relevant to their work. The efficiency of the document delivery service has increased markedly.

#### New Products

Three new products were produced and made available to National Agricultural Library users. The List of Journals Indexed (LJI) by NAL was printed and made available to users. The Quinquennial (5 year) cumulation of the ultimate printed NAL catalog was compiled. The AGRICOLA corrections file was made available as a retrospective file including over 20,000 corrections made since 1970 to the bibliographic records in AGRICOLA

#### Library Services Division

The Law Library Branch and the Food and Nutrition Information and Education resources Center were transferred to the Library Services Division joining the Lending Branch, the Reference Branch and the D.C. Branch. Thus, all essentially conventional library and interlibrary services are available through a single Division.

#### Foreign Mailing List

TIS is attempting to enhance the current system of distributing USDA publications to foreign sources by making it more economical and effective. The Library maintains a mailing list of about 24,000 foreign addresses of institutions and individual to which USDA publications are distributed free of charge on a regular basis. Only about 50 percent of these are reciprocating by sending the Library publications in exchange for their receipts. In January 1977, the Procurement Section began sending letters of inquiry to nonreciprocating sources to determine their interest in the continuing receipt of USDA items. In FY 1978, 10,655 letters of inquiry were dispatched. A total of 4,518 sources have responded indicating that their addresses could be removed from the mailing list. Removal of these addresses, as well as others to come, will result in savings in the Department by eliminating unnecessary mailings and to the Library by reducing costs associated with maintaining the mailing list.



Consolidated Purchasing of Publications Program

This program, designed to save the Department considerable money through a system of group purchasing of journals and related materials, has been delegated to SEA. More than \$120,000 of direct costs over a five year period has been saved through a pilot contract with one publisher. An intensive effort is now underway to contract with other publishers. The cost of writing separate purchase orders for each journal subscription by USDA scientists and cooperating institutions, as is presently done, has not been included in the above figure.

The following is a geographic breakdown of obligations and man years by locations:

	: 1978	:	: 1979	:	: 1980	:
	: Man	:	: Man	:	: Man	:
	: Years	:	: Years	:	: Years	:
	: Amount	:	: Amount	:	: Amount	:
Washington, D.C.	: 593,560	: 16.9	: 682,000	: 16.9	: 682,000	: 16.9
Beltsville, MD.	: 6,124,077	: 193.1	: 7,045,000	: 205.1	: 7,153,000	: 205.1
	: 6,717,637	: 210	: 7,727,000	: 222	: 7,835,000	: 222



Buildings and Facilities

Appropriation Act, 1979.....	\$	35,720,000
Budget Estimate, 1980.....		-0-
Decrease in appropriation.....		<u>-35,720,000</u>

SUMMARY OF  
INCREASES OR DECREASES

<u>Item</u>	<u>1979 Estimated</u>	<u>Decrease or Increase</u>	<u>1980 Estimated</u>
Buildings and Facilities....	\$ 35,720,000	\$ -35,720,000	-0-

The 1980 estimate reflects a decrease of \$35,720,000 in non-recurring funds for construction projects provided in 1979.

CONSTRUCTION PROJECTS

Fruit and Nut Germplasm Repository (Corvallis, Oregon).....	\$	500,000
Plant Stress Center (Lubbock, Texas).....		800,000
Mint Research Greenhouse (Corvallis, Oregon).....		20,000
Human Nutrition Center at Tufts University (Boston, Massachusetts).....		21,100,000
Planning for Move of Animal Disease Center (Denver, CO).....		700,000
North Central Dairy Research Center (Madison, Wisconsin)....		9,000,000
Soil Erosion Center at Purdue University (Lafayette, IN)....		<u>3,600,000</u>
TOTAL.....		35,720,000





Status of Construction Projects as of December 1978

Status of research facilities authorized in prior years, and reported as uncompleted in the 1979 Explanatory Notes, is as follows:

NOTE: (Design criteria provided by AR to specify the program requirements and form the basis for negotiation of architect-engineer contracts. Diagrammatic drawings or concept drawings provide the basis for the first review of the architect's design. Tentative drawings or architect's design are provided by the architect for firming up cost estimates and a basis for developing the completed, and final working drawings.)

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided</u> <u>Amount</u>	
<u>Colorado, Fort Collins</u>			
Animal disease center	1979 Plans.....	\$ 700,000	Design criteria is being developed. AE contract expected to be awarded in the second quarter of fiscal year 1979.
<u>Indiana, West Lafayette</u>			
Soil and water laboratory	1978 Plans.....	400,000	AE contract was awarded in third quarter of fiscal year 1978.
	1979 Construction.....	3,600,000	Concept drawing was received in the fourth quarter of fiscal year 1978. Architect's design expected to be completed in the second quarter of fiscal year 1979.
	Total.....	4,000,000	Construction expected to be completed in the third quarter of FY 1981.

Status of Construction Projects as of December 1978-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided</u> <u>Amount</u>	
<u>Louisiana, Baton Rouge</u> Soil and water conservation research	1971 Plans.....	\$ 80,000	Design criteria being revised to meet new program requirements.
<u>Maryland, Beltsville</u> Sewage treatment facilities	1975 Construction.....	1,400,000 <sup>a/</sup>	Construction was completed for sewer and water lines in fourth quarter of fiscal year 1977.
	1976 Construction.....	2,350,000	Construction of the East and West Waste Water Treatment Plants was completed in the first quarter of fiscal year 1979.
	Total.....	3,750,000 <sup>b/</sup>	
<u>Massachusetts, Boston</u> Adult human nutrition laboratory	1978 Plans .....	2,000,000	AE contract was awarded in the fourth quarter of fiscal year
	1979 Construction.....	21,100,000	1978. Architect's design expected to be completed in the fourth quarter of fiscal year 1979.
	Total.....	23,100,000	Construction expected to be completed in the first quarter of fiscal year 1982.
<u>New York, Plum Island</u> Additional animal and laboratory facilities	1973 Plans.....	250,000	Construction expected to be completed in fourth quarter of fiscal year 1979.
	1976 Construction.....	10,000,000	
	1977 Redirection.....	294,000 <sup>c/</sup>	
	1977 Redirection.....	700,000 <sup>d/</sup>	
	1978 Redirection.....	900,000 <sup>e/</sup>	
	Total.....	12,144,000	



Status of Construction Projects as of December 1978-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided Amount</u>	
<u>New York, Plum Island</u> Air pollution abatement and sewage treatment facilities	1973 Plans and construction.....	1,060,000 <u>a/</u>	Air pollution abatement incin- erator B modification and con- struction expected to be com- pleted in the fourth quarter of fiscal year 1979. Incinerator A expected to be completed in the third quarter of fiscal year 1979. The sewage treat- ment facilities construction is expected to be completed in the fourth quarter of fiscal year 1979.
	1976 Construction.....	2,600,000	
	1977 Redirection.....	-194,000 <u>c/</u>	
	Total.....	3,466,000	
<u>North Dakota, Grand Forks</u> Human nutrition research	1976 Plans.....	225,000	AE contract was awarded in the third quarter of fiscal year 1978. Architect's design is expected to be completed in the fourth quarter of fiscal year 1979. Construction expected to be completed in the second quarter of FY 1981.
	1978 Construction.....	3,500,000	
	Total.....	3,725,000	
<u>North Dakota, Mandan</u> Greenhouse facility	1978 Construction.....	375,000 <u>a/</u>	Final working drawings were received in the fourth quarter of fiscal year 1978. Construction contract was awarded in the fourth quarter of fiscal year 1978. Construction expected to be com- pleted in the first quarter of fiscal year 1980.

Status of Construction Projects as of December 1978-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided Amount</u>	
<u>Oklahoma, El Reno</u> Feed mill replacement	1978 Construction.....	\$ 1,500,000 <u>a/</u>	AE contract was awarded in the third quarter of fiscal year 1978. Architect's design is expected to be completed in the third quarter of fiscal year 1979. Construction expected to be completed in the first quarter of fiscal year 1982.
<u>Texas, Lubbock</u> Moisture conservation and plant stress laboratory	1978 Feasibility study 1979 Plans..... Total.....	100,000 <u>f/</u> 800,000 <u>900,000</u>	Design criteria being prepared. AE contract expected to be awarded in the third quarter of fiscal year 1979.
<u>West Virginia, Beckley</u> Soil and water conservation research	1972 Plans..... 1973 Construction..... 1976 Redirection..... 1977 Redirection..... Total.....	70,000 700,000 40,000 <u>g/</u> <u>1,509,000 d/</u> <u>2,319,000</u>	Construction contract was awarded in the third quarter of fiscal year 1978. Construction expected to be completed in the first quarter of fiscal year 1980.
<u>West Virginia, Kearneysville</u> Fruit crop research	1973 Plans..... 1976 Construction..... 1977 Redirection..... Total.....	200,000 7,570,000 <u>-2,209,000 d/</u> <u>5,561,000</u>	Construction was completed in the fourth quarter of fiscal year 1978.

Status of Construction Projects as of December 1978-Cont.

<u>Location and Purpose</u>	<u>Year</u>	<u>Funds Provided</u> <u>Amount</u>	
<u>Wisconsin, Madison</u>			
Dairy forage research center	1978 Plans.....	\$ 1,100,000	This facility will be located on two sites. Baraboo field site (military base Wisconsin): AE contract was awarded in the fourth quarter of fiscal year 1978. Architect's design expected to be completed in the third quarter of fiscal year 1979.
	1979 Construction.....	9,000,000	
	Total.....	<u>10,100,000</u>	
			University of Wisconsin campus site: Concept drawing received the first quarter of fiscal year 1979. Architect's design expected to be completed in the fourth quarter of fiscal year 1979.
			Construction of both sites expected to be completed in the fourth quarter of fiscal year 1982.



Status of Construction Projects as of December 1978-Cont.

Footnotes:

- a/ Planning funds were not appropriated separately, but are included in the funds appropriated for construction.
- b/ In addition, the Department of Treasury provided \$100,000 toward costs incurred in completing the project.
- c/ \$194,000 were redirected from the air pollution abatement and sewage treatment project to provide funds for pollution abatement facilities in the animal and laboratory project as originally planned. An additional \$100,000 has been redirected into the animal and laboratory project from regular program funding.
- d/ Due to cost escalation and to provide funds to complete facilities as originally planned and designed at the Beckley, West Virginia, project and the Plum Island animal and laboratory project, funds were redirected from Kearneysville, West Virginia.
- e/ \$900,000 were reprogrammed to finance unexpected and essential design modifications and to provide for future contingency costs. \$350,000 is to be charged to fiscal year 1977 unobligated balances and \$550,000 to fiscal year 1978.
- f/ Funds for a Feasibility Study of the need for a plant and moisture stress laboratory.
- g/ Due to cost escalation, funds for the Ithaca, New York, project were redirected to Beckley, West Virginia, to provide sufficient funds to construct the facility.

Scientific Activities Overseas (Special Foreign Currency Program)

Appropriation Act, 1979.....	\$5,750,000
Budget Estimate, 1980.....	<u>7,500,000</u>
Increase in Appropriation.....	+1,750,000

PROJECT STATEMENT  
(on basis of appropriation)

Project	1978 Actual	1979 Estimate	Increase or Decrease	1980 Estimate
1. Market development research, Sec. 104(b)(1).....	\$800,000	\$800,000	+\$200,000	\$1,000,000
2. Agricultural and forestry research, Sec. 104(b)(3) ...	4,450,000	4,450,000	+1,100,000	5,550,000
3. Translation and dissemination of scientific publi- cations, Sec. 104(b)(3) .....	500,000	500,000	+450,000	950,000
Total, appropriation.....	<u>5,750,000</u>	<u>5,750,000</u>	<u>+1,750,000</u>	<u>7,500,000</u>

The following statement reflects carryover into succeeding years of actual or estimated prior year balances and shows total actual or planned obligations.

PROJECT STATEMENT  
(on basis of available funds)

Project	1978 Actual	1979 Estimate	Increase or Decrease	1980 Estimate
1. Market development research, Sec. 104(b)(1) .....	\$323,279	\$800,000	+\$200,000	\$1,000,000
2. Agricultural and forestry research, Sec. 104(b)(3) ....	6,310,075	5,110,054	+439,946	5,550,000
3. Translation and dissemination of scientific publi- cations; Sec. 104(b)(3).....	1,077,000	539,594	+410,406	950,000
Total, obligations.....	<u>7,710,354</u>	<u>6,449,648</u>	<u>+1,050,352</u>	<u>7,500,000</u>
Unobligated balance, start of year.....	-2,660,002	-699,648	+699,648	--
Unobligated balance, end of year.....	+699,648	--	--	--
Total, available or estimate.....	<u>5,750,000</u>	<u>5,750,000</u>	<u>+1,750,000</u>	<u>7,500,000</u>

## EXPLANATION OF PROGRAM

Foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States are used for expenses of carrying out programs of the Department of Agriculture as authorized by law and described under sections 104(b) (1) and 104(b) (3) of the Agricultural Trade Development and Assistance Act of 1954, as amended. Research is carried on through agreements negotiated with research institutions and organizations in foreign countries. The research must be of importance to American agriculture. It serves to preserve and expand existing markets and develop new ones for agricultural commodities. It provides for research supplementary to domestic programs on problems of farm marketing, utilization, agricultural economics and human nutrition, and makes possible the conduct of research on exotic insect pests and diseases of plants and animals which could not be done in the United States. Specialized projects provide for the translation and dissemination of foreign language scientific publications.

## JUSTIFICATION OF INCREASE

An increase of \$1,750,000 for special foreign currency research (\$5,750,000 available in 1979).

Need for Change: The increase proposed in FY 1980 would be used to finance research overseas through the purchase of excess foreign currencies. For FY 1980 excess currencies are expected to be available in five countries--Burma, Guinea, India, Pakistan, and the Arab Republic of Egypt. Based on surveys of the scientific capacity of foreign institutions and evaluation of surveys of the scientific capacity of foreign institutions and evaluation of research proposals submitted by these institutions, the total amount requested for FY 1980 would be effectively used to finance research of a mutual interest.

Estimated obligations for FY 1979, based on available and negotiated research proposals, total approximately \$6.5 million.

At present, there are approximately 76 approved research proposals which cannot be financed with FY 1979 funds, 40 additional proposals are being reviewed or being revised by Department scientists, and based on past experience an additional 60 proposals will be received during the course of FY 1979. Of those received in FY 1979, approximately 30 are expected to be approved for research. Leading into 1980, we should have over 146 approved proposals awaiting financing, of which approximately 35 could be funded within the FY 1980 estimate of \$7,500,000. With the gradual depletion of excess foreign currency on deposit for U.S. uses, it is immediately important to move forward to be sure that a fair share of remaining currencies is dedicated to cooperative agricultural research and exchanges in science and technology which will benefit all countries concerned by developing better ways to meet the ever growing food and fiber needs. SFC research is tending more toward macro-projects. Although these are more costly, they offer the advantages of integrated research and increase the opportunities for more immediate solutions to problems. Overseas research utilizing foreign currencies under sections 104(b)(1) and (3) of Public Law 480, as amended, supplements and complements research conducted in the United States under regular dollar appropriations. These foreign research projects do not duplicate or displace domestic research conducted by the Department or its cooperators. The projects are of mutual interest to the United States and the host countries. In addition to developing scientific information of great importance to American agriculture, the research under this program is making a significant contribution to the solution of agricultural problems of the lesser developed countries in which it is carried out. Furthermore, the knowledge gained makes a direct contribution to alleviating the world's food shortage, the need for which was emphasized at the World Food Conference.

Nature of Change: It is estimated that the \$1.75 million increase will be used for new grants to undertake studies aimed at solving high priority agricultural problems as follows: Crop production and protection, \$1.358 million; animal production and protection, \$0.191 million; and natural resources and forestry, \$0.201 million. Important program priorities include research on: new and improved uses of cotton; improvement of market quality of exported farm products; improvement of transportation and storage methods; cereal grains, grain legumes and oilseeds, including new and improved plant germplasm and biocontrol methods for crop pests; pesticide residues; improved soil and water use; the development of alternative agricultural production systems in narcotic producing areas; pollution; food safety; nutrition and health; environmental resources; and timber production.



#### STATUS OF THE SPECIAL FOREIGN CURRENCY RESEARCH PROGRAM (SFCRP)

In fiscal year 1958, the Department initiated a research grant program abroad utilizing foreign currencies from the sale of surplus agricultural commodities under Title I of Public Law 480. Originally confined to market development research authorized by Section 104(b) (1) of P.L. 480, as amended, the program was subsequently expanded to include agricultural and forestry research under Section 104(b) (3) of the law, as amended. In fiscal year 1966 the authorization was changed to permit the use of all excess currencies for work performed under the Special Foreign Currency Program. Activities sponsored fall into the following general areas:

1. Agricultural research, including research on plant and animal production; use and improvement of soil, water and air; and research on marketing, use and effects of agricultural products.
2. Forestry research, including research on the protection of forests from fires, diseases and insects; on methods and procedures for increasing the growth of managed forests, and on properties and uses of forest products.
3. Agricultural economics research, including farm and market economics research and foreign trade analysis.

Dollar-financed research in these areas is conducted by the Agricultural Research unit of SEA, the Forest Service, and the Economic Research component of ESCS in their respective areas of functional and subject-matter responsibilities. Research under this program is designed to complement and not to duplicate or displace the dollar-financed research activities of these agencies.

Within the Department, primary responsibility for administration of this program is assigned to the International Programs Staff component of SEA. The activities are coordinated with operations in the Forest Service, Economic Research component of ESCS, APHIS, and the Foreign Agricultural Service by the Director, International Programs Staff, SEA. The Director coordinates development of broad policies for operations of the program and coordinates the activities of the various Department agencies in carrying out research financed by foreign currencies. Initial arrangements and budget clearances for the research in foreign countries are made through the Department of State as required by Executive Order 10900, Section 3(b) and (c), and through the Agricultural Attaches of the Foreign Agricultural Service of the Department. Prior to executing any research agreement with a foreign institution, the Department again consults with the Agricultural Attaches and Heads of Missions to ensure that the proposed projects would be consonant with the foreign policy of the United States.

Care is exercised to make certain that research projects supported by special foreign currency benefit American agriculture and consumers. Careful attention is given to the type of institution conducting research under this program to make certain it has the facilities, equipment, and personnel to carry out sound and productive research. Because of these high standards during the life of the program, about 59 percent of the proposals received from foreign institutions have been rejected by the Department; 40 percent of the proposals have been accepted, and the agreements have been executed or are awaiting execution. Final determination has not yet been made on acceptance or rejection of the remaining 1 percent.

U.S. research priorities, as well as foreign country participant priorities, are constantly updated and publicized through personal contacts and written communications. Consequently, the bulk of the proposals currently submitted for consideration are generally of the highest interest to U.S. agriculture.

Selected Examples of Recent Progress: In fiscal year 1978, 38 new agreements were obligated with foreign research institutions. Agreements vary in total dollar equivalent amounts for the life of the project from approximately \$12,000 to slightly over \$563,000. Examples of recent research programs under these agreements follow:

New Breeding Lines of Winter Lentils for Pacific Northwest (Turkey). Lentils, grain legumes which produce a high protein food for humans, are an important spring-sown crop in the Pacific Northwest. Winter varieties discovered under a Turkish project were evaluated and the best eight forwarded to Pullman, Washington, for further testing for resistance to cold and root rot. Results are a winter hardy breeding line (WH 2040) now available as a source of superior germplasm to lentil breeders and research institutions. WH 2040 was planted in eastern Washington in October and November, and seedlings were exposed to wind and temperatures of  $-23^{\circ}$  C. without snow cover protection. There was no appreciable permanent damage to vital plant tissues and this breeding line showed a strong resistance to soilborne pathogens in field plots where 97 percent of the other test plants were seriously damaged by root rot disease.

Poplar Tree Resistance to Fungal Infection Identified (Poland). Loss of poplar tree planting stock due to fungal infections can devastate plantations of poplars in sites where drought, frost injury, or other factors place the trees under stress. Polish scientists have identified five interrelated factors mediating resistance to fungal infection in poplar hybrids. Resistant poplars had: 1) more resident microorganisms in the bark antagonistic to the fungal infection; 2) higher levels of phenolic glucosides; 3) certain enzymes which convert phenolic glucosides to toxic substances; 4) high levels of soluble sugars in the bark which repress formation of fungal enzymes that degrade host cell walls; and 5) high levels of internal growth regulators which decrease the pathogenicity of fungi. Results suggested that clones of hybrid poplars could be screened for resistance to fungal infection by measuring the internal levels of glucosides in the bark. Such a screening technique is especially applicable to hybrid poplar research now underway in a number of states representing a wide range of climates.

Improved Rice Germplasm for USDA Collection (Pakistan). Under a Pakistani project collections and evaluations of rice have supplied new germplasm which may provide badly needed genes for the U.S. rice variety improvement program. The Pakistanis assembled 1,404 entries of rice germplasm. Most of these entries have been added to the USDA Rice Germplasm Collection, and seed has been increased under quarantine for the majority of them. Examples of improved characteristics include: cold, heat, and salt tolerance; resistance to the fungus causing blast disease; and resistance to the stem borer. Much, if not most, of the information about resistance of the accessions to blast disease, stem borer damage, and to salt tolerance is new. One of the entries was rated moderately resistant to stem rot and resistant to blast disease in field tests. This double resistance is of considerable importance to U.S. rice breeders.

Herbicides Found Not to Affect Vegetable Quality and Yields (Poland).

Polish scientists have conducted tests on the long-term effect of herbicides on yield and quality of vegetable crops. The studies were conducted over a period of 7 years, one of the longest known studies of this type in vegetable crops. Herbicides used were Prometryne, linuron, monolinuron, and lenacil. Results showed that at recommended doses, or double the recommended doses, none of the herbicides used in carrot, spinach, leek, and dry bean test crops (under continuous cultures or rotations) resulted in any decreases in crop yield or quality. Bioassay results showed no herbicide residue accumulation even in the high-dose and continuous-use plots.

Extending Life and Value of Farm Waste Lagoons (India). The biomass of farm lagoons has potential as a new source of feed, fertilizer, and fuel. Lagoons, or holding ponds, are widely used for handling livestock wastes and, when properly managed, work on a beneficial cycle of oxygen and carbon dioxide. Technical and economic problems of harvesting lagoon biomass have been a major obstacle in large-scale development of algae from this source for animal feed and for fertilizer. Indian scientists have developed a harvesting technique for the biomass that is simple and inexpensive. The biomass can be flocculated or formed into clumps. These clumps or floc formations then sink, trapping most of the biomass. Under proper conditions the entire mass will rise and float, permitting easy removal. This harvesting technique developed by the Indians can prolong the life of a lagoon as a sewage disposal unit, and, if further research proves the potential of biomass harvest for soil amendment and livestock feed, the results of this project will be of considerable value to agriculture and the environment. The lagoon biomass might also be used for methane gas production, adding another source of energy.

Cotton Textile Improvement From Raw Material Findings (India). Indian studies of cotton fiber as a raw material indicate that the extent of cotton fiber swelling is directly related to the hollow space (lumen) inside an untreated fiber; therefore cotton varieties having larger lumens tend to swell more extensively. This produces a more uniform fiber and results in more evenly distributed stress within the fiber. Other Indian findings are: (1) flexural fatigue is a function of fiber cell wall thickness, (2) there is a threshold value for cell wall thickness below which fibers exhibit no fatigue strength, and (3) mercerization increases fatigue life with respect to flexural bending as well as tensile strength uniformity. Knowledge gained from the data helps explain the response of different cotton varieties to chemical modifications, the effect of specific fiber structure upon yarn and fabric performance, and adds greatly to the understanding of cotton fiber as a textile raw material.



SPECIAL FOREIGN CURRENCY PROGRAM  
RESEARCH PROPOSALS AND AGREEMENTS BY SUBJECT MATTER  
(Through September 30, 1978)

	Number of Proposals			Total Number of Agreements Obligated		Total Number of Agreements Currently Active	
	<u>Received</u>	<u>Rejected</u>	Awaiting Modification Negotiation or Review	Approved (Proposals) Awaiting Negotiation	Dollar Equivalent		Dollar Equivalent
					Number	Number	
Agricultural Research Service.....	4,064	2,447	24	94	1,499	\$104,322,755	270 \$29,915,331
Forestry Research.....	523	266	1	21	235	16,803,894	40 5,369,978
Economics Statistics and Cooperatives Service.....	165	117	2	1	45	2,949,937	5 1,085,825
Animal & Plant Insp. Service.....	1	-	-	-	1	145,934	1 145,934
Statistical Reporting Service.....	3	2	-	-	1	32,073	- 1,467
TOTALS.....	<u>4,756</u>	<u>2,832</u>	<u>27</u>	<u>116</u>	<u>1,781<sup>1/</sup></u>	<u>\$124,254,593</u>	<u>316 \$36,515,601</u>

1/ This figure does not include six grants, still unexecuted, financed by Polish owned zlotys for a total of United States Dollar equivalent of \$605,694.

Obligations, Expenditures, and Conversions of Foreign Currencies

Obligations: Through September 30, 1978, a total of \$134,242,005 (including \$5,630,243 for administrative expenses) has been obligated for activities under the Special Foreign Currency Program. In fiscal year 1979, an additional \$6,449,648 will be used. These obligations are summarized as follows:

Cumulative Obligations through F.Y. 1979  
(Dollars in Thousands)

Fiscal Year	Market Development Research (Sec. 104(b) (1))	Agricultural and Forestry Research (Sec. 104(b) (3))	Translations of Publications and Scientific Cooperation, Executive Office of the President a/ Office of the President a/	Total
1958	\$ 371.5	\$ -	\$ -	\$ 371.5
1959	1,651.8	-	1.7	1,653.5
1960	2,230.5	-	793.2	3,023.7
1961	1,893.2	1,832.4	1,565.2	5,290.8
1962	2,859.0	5,294.6	595.8	8,749.4
1963	2,566.3	5,000.7	248.6	7,815.6
1964	3,214.8	4,466.4	555.5	8,236.7
1965	3,485.8	5,408.1	72.2	8,966.1
1966	703.7	3,877.4	-199.5	4,381.6
1967	1,620.6	7,953.2	114.5	9,688.3
1968	991.9	6,317.0	- 44.1	7,264.8
1969	971.9	4,733.2	-	5,705.1
1970	790.5	4,076.0	-	4,866.5
1971	654.0	4,171.8	-	4,825.8
1972	840.4	5,853.6	-	6,694.0
1973	1,026.1	7,995.8	-	9,021.9
1974	195.9	7,551.5	-	7,747.4
1975	349.2	6,263.6	-	6,612.8
1976 b/	326.6	9,044.7	-	9,371.3
1977	414.1	5,830.5	-	6,244.6
1978	323.3	7,387.1	-	7,710.4
1979 (est'd)	800.0	5,649.6	-	6,449.6
Total	\$28,281.1	\$108,707.2	\$3,703.1	\$140,691.4

a/ This fund merged with Special Foreign Currency Program by the Department of Agriculture and Related Agencies Appropriation Act, 1969. b/ Includes Transitional Quarter.

The following tables present a more detailed picture of the \$7,710.4 obligated in 1978 and the \$6,449.6 estimated to be obligated in 1979 for the Special Foreign Currency Program.

Special Foreign Currency Program Fiscal Year 1978 Obligations  
(In Thousands)

Market Development Research Section 104 (b) (1)		Agricultural and Forestry Research Section 104 (b) (3)			
Country	Agricultural Research	Agri- cultural Research	Economics Statistics And Cooperatives Service	Forestry Research	Total
Burma.....	\$ --	\$ .2	\$ --	\$ --	.2
Egypt.....	21.4	3,746.9	288.0	488.8	4,545.1
Germany.....	.3	--	--	--	.3
Guinea.....	--	.1	--	--	.1
India.....	388.6	491.0	44.7	67.4	991.7
Israel.....	- 3.8	- 20.6	- 1.2	- 1.7	- 27.3
Italy.....	- .6	- 2.2	--	- 2.3	- 3.9
Morocco.....	--	7.7	--	--	7.7
Pakistan.....	- 26.2	942.6	--	771.3	1,687.7
Poland .....	- 56.9	505.7	--	--	- 562.6
Sri Lanka.....	--	- 13.6	- 2.1	- 2.1	- 17.8
Tunisia.....	--	13.0	--	2.6	15.6
Turkey.....	--	.3	--	--	.3
United Kingdom....	.5	--	--	--	.5
Yugoslavia.....	--	- 11.4	--	--	- 11.4
Total.....	323.3	4,652.1	329.4	1,328.6	6,633.4

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Transfer to National Science Foundation for translation of scientific publications.... 1,077.0

GRAND TOTAL ..... 7,710.4



Special Foreign Currency Program - Estimated FY 1979 Obligations  
(In Thousands)

Market Development Research Section 104(b)(1)		Agricultural and Forestry Research Section 104(b)(3)			
Country	Agricultural Research	Agri- cultural Research	Economics, Statistics and Cooperative Service	Forestry Service	Total
Burma.....	\$ - -	\$ 50.0	\$ - -	\$ - -	\$ 50.0
Egypt.....	400.0	2,366.0	130.0	104.0	3,000.0
Guinea.....	- -	50.0	- -	- -	50.0
India.....	200.0	861.0	73.5	115.5	1,250.0
Italy.....	3.0	.5	- -	.5	4.0
Pakistan.....	197.0	971.7	129.1	258.2	1,556.0
Total.....	\$800.0	\$4,299.2	\$332.6	\$478.2	\$5,910.0
Transfer to National Science Foundation for translation to scientific publications .....					
					539.6
GRAND TOTAL.....					\$6,449.6

Expenditures: Expenditures of foreign currencies, from the inception of the program through September 30, 1978, totaled \$115,699,445. In addition, the Department plans to expend \$6,900,000 in fiscal year 1979. These expenditures may be summarized as follows:

Cumulative Expenditures through F.Y. 1979  
(In Thousands)

Fiscal Year	Market Development Research	Agricultural and Forestry Research	Translation of Publications and Scientific Cooperation Executive Office of the President a/	Total
1959	\$ 195.1	\$ - -	\$ 0.1	\$ 195.2
1960	654.6	- -	75.1	729.7
1961	1,254.9	350.2	495.2	2,100.3
1962	1,735.8	1,351.8	425.6	3,513.2
1963	2,136.8	2,071.7	590.9	4,799.4
1964	2,292.9	2,514.9	655.5	5,463.3
1965	2,816.3	3,724.6	616.0	7,156.9
1966	2,435.2	4,113.9	211.2	6,760.3
1967	2,487.0	4,754.6	224.7	7,466.3
1968	1,951.0	5,028.8	200.5	7,180.3
1969	1,598.9	5,454.6	- -	7,053.5
1970	1,092.6	4,863.4	- -	5,956.0
1971	955.9	4,753.1	- -	5,709.0
1972	884.2	5,337.3	- -	6,221.5
1973	704.1	4,644.0	- -	5,348.1
1974	731.2	7,052.9	- -	7,784.1
1975	783.6	6,491.7	- -	7,275.3
1976 b/	902.9	9,477.8	- -	10,380.7
1977	403.5	6,699.0	- -	7,102.5
1978	551.4	6,952.6	- -	7,504.0
1979 (est'd)	469.2	6,430.8	- -	6,900.0
Total.....	\$27,037.1	\$92,067.7	\$3,494.8	\$122,599.6

Cumulative Expenditures through F.Y. 1979  
(In Thousands)

Conversions: As of September 30, 1978, the Department has converted a total of \$4,833,448 of foreign currencies as follows:

<u>Fiscal Year</u>	<u>(Dollars in Thousands)</u>
1961 .....	\$ 770.0
1962 .....	1,432.0
1963 .....	1,910.1
1964 .....	721.3
Total .....	<u>\$ 4,833.4</u>

a/ This fund merged with Special Foreign Currency Program by the Department of Agriculture and Related Agencies Appropriation Act, 1969, are included in the preceding table.

b/ Includes Transitional Quarter.





Passenger Motor Vehicles

The 1980 Budget Estimate does not include any purchase of additional passenger motor vehicles, or any replacement of its 472 passenger motor vehicles.

The passenger motor vehicles of this Agency are used by research scientists and staff personnel in the course of their daily work. These vehicles are operated chiefly at field stations engaged in research. These vehicles are used in travel where common carriers are seldom feasible. This involves travel to individual farms, ranches, commercial firms, cooperating experiment stations, etc. The vehicles are essential for collecting experimental data and materials necessary for facilitating research work.

It is the policy of Agricultural Research to pool the use of motor vehicles to keep the number of vehicles to a minimum and reduce overall costs for maintenance.

Age and Mileage Data for passenger-carrying vehicles on hand as of September 30, 1978:

<u>Age-Year</u> <u>Model</u>	<u>Number of</u> <u>Vehicles*</u>	<u>Percent</u> <u>of Total</u>	<u>Lifetime</u> <u>Mileage</u> (thousands)	<u>Number of</u> <u>Vehicles*</u>	<u>Percent</u> <u>of Total</u>
1973	232	49	80-100	21	5
1974	62	13	60- 80	91	19
1975	27	6	40- 60	127	27
1976	42	9	20- 40	101	21
1977	47	10	Under 20	132	28
1978	<u>62</u>	<u>13</u>	<u>- -</u>	<u>- -</u>	<u>--</u>
Total	472	100		472	100

\* Includes 6 vehicles used in foreign countries, and 8 buses.

Aircraft

There are no planned additions or replacements for any of the seven aircraft owned by this Agency in FY 1980. These aircraft are located at College Station, Texas; Weslaco, Texas and Yakima, Washington. They are used in control methods, application of agricultural materials, infrared and color photography, and evaluating efficiency affects on weather conditions.







